

NOVEMBER 1959



# CHEMICAL PROCESSING

with PROCESS DYNAMICS

Solids fluidization saves fuel, boosts  
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by urethane-foam insulation.....38

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## CHEM SHOW PREVIEW

• New Developments Spotlited  
In Guided Tour ..... 30

New York Coliseum

November 30 to December 4

A Putman Publication  
"Executive Magazines for Industry"

\$7.00 the copy



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For 60 years, General Chemical has been the nation's primary producer of heavy acids. General has its own basic raw material sources. Its production facilities include 21\* sulfuric plants, 4\* hydrofluoric plants, 3 nitric and 3 muriatic acid plants. It operates one of the nation's largest fleets of tank cars, tank trucks and acid-carrying barges, and distributes from key points coast-to-coast. General's production, transportation, service and sales facilities are geared to meet your requirements best, both in quality of product and dependability of service. Write or phone today for information or service.

Basic to America's Progress



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\*In Canada: Allied Chemical Canada, Limited

Check 1607 opposite last page.

### SULFURIC ACID

Standard: 60° and 66° Baumé,  
99% H<sub>2</sub>SO<sub>4</sub>  
Diamond: 66° Baumé  
Reagent, ACS

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Diamond: 36°, 38°, 40°, and 42° Baumé  
Strong Nitric Acid, 95% and  
fuming grades  
Photo-Engravers' Grade  
Reagent, ACS

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Anhydrous, Aqueous 70%, and Reagent

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Wet Process, 65% and 75%, Com'l and  
Fertilizer Grades  
Food Grade, 75%  
N.F., 85%

### MIXED ACID

Varying proportions of Nitric and Sulfuric Acids  
to meet customers' requirements



### conventions and exhibits

November 2-4. Atomic Industrial Forum & American Nuclear Society, Coordinated Conference, Sheraton-Park Hotel, Washington, D.C.

November 2-5. 11th Exposition of the Air-Conditioning and Refrigeration Industry, Convention Hall, Atlantic City, New Jersey.

November 2-5. The Metallurgical Society of AIME, Morrison Hotel, Chicago, Ill.

November 2-6. 41st National Metal Exposition & Congress, International Amphitheatre, Chicago, Illinois.

November 4-6. Technical Association of the Pulp and Paper Industry, Alkaline Pulping Conference, Robert Meyer Hotel, Jacksonville, Florida.

November 4-6. American Nuclear Society Winter Meeting, Sheraton-Park Hotel, Washington, D. C.

November 5-6. Industrial Management Society, 23rd Annual National Industrial Engineering and Management Clinic, Conrad Hilton, Chicago.

November 9-11. American Petroleum Institute, 39th Annual Meeting, Conrad Hilton, Palmer House, Congress Hotels, Chicago, Illinois.

November 16-18. 21st Annual National Packaging Forum of the Packaging Institute, Statler-Hilton Hotel, New York City.

November 24. Manufacturing Chemists' Association, 9th Semiannual Midwinter Meeting, Hotel Statler, New York City.

November 30-December 1. 1959 Exposition of Chemical Industry, Coliseum, New York City.

December 6-10. American Institute of Chemical Engineers, Annual Meeting, Sheraton Palace Hotel, San Francisco.

December 7-9. Chemical Specialties Manufacturers



...Meetings and shows of interest to the chemical industries

Association, 46th Annual Meeting, Mayflower Hotel, Washington, D.C.

January 13-15. Society of Plastics Engineers, Inc., 16th ANTEC, Conrad Hilton Hotel, Chicago, Illinois.

January 22. Engineers Joint Council, Annual Meeting, New York, N.Y.

January 25-28. Plant Maintenance & Engineering Show, Convention Hall, Philadelphia, Pa.

February 1-4. American Society of Heating, Refrigerating and Air Conditioning Engineers, Semi-Annual Meeting, Dallas, Texas.

February 1-5. Instrument Society of America, Instrument and Automation Conference & Exhibit, Sam Houston Coliseum, Houston, Texas.

February 2-4. Fifteenth Society of the Plastics Industry, Reinforced Plastics Division Conference, Edgewater Beach Hotel, Chicago, Ill.

February 14-18. American Institute of Mining, Metallurgical, and Petroleum Engineers, Annual Meeting, New York City, N.Y.

February 21-24. American Institute of Chemical Engineers, National Meeting, Biltmore Hotel, Atlanta, Georgia.

February 22-25. Technical Association of the Pulp and Paper Industry, Annual Meeting, Commodore Hotel, New York City, N.Y.

February 29-March 4. The Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Exposition of Modern Laboratory Equipment, Penn-Sheraton Hotel, Pittsburgh, Pennsylvania.

March 13-17. National Association of Corrosion Engineers, National Meeting, Buffalo, N.Y.

March 14-18. National Association of Corrosion Engineers, National Meeting, Dallas, Texas.



Fred Godley, manager of Continental Manufacturing's sales engineering section explains...

VISIT BOOTH #876  
THIRD FLOOR  
Chemical Industry Exp.  
N.Y. COLISEUM

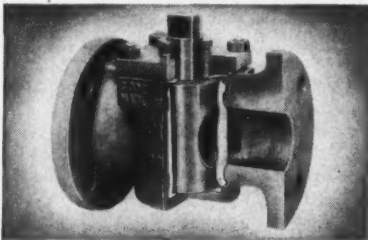
## "Why Tufline self-lubricated valves are specified"

Many engineers are re-evaluating that old stand-by, the "shut-off" valve, and are finding out for themselves that some improvements have been made. The result is that every day more Tufline\* plug valves are being specified for both new construction and replacement use.

Why? Because of their design, Tufline valves cannot stick or gall while still remaining bubble tight after years of service. This is made possible by the fact that Tufline's tapered plug is seated in a resilient sleeve of pure Teflon® locked in the body bore. In other words, the sealing is effected without any metal-to-metal contact, grease film, or flexing diaphragm.

Tufline's design "secret" is in the configuration of the inner body bore, with its integral sealing ribs and carefully proportioned relief areas coupled with the special tempering of the pure Teflon sleeve. This combination permits the sleeve to expand or contract with changes in temperature or pressure while still maintaining its resilience at the critical sealing areas.

**Result: Tufline valves seal without leakage through the line or to the outside even throughout repeated temperature cycling up to a maximum of 250° F within their operating range (—150° F to +450° F).**



### TYPICAL USAGE

Standard Tufline valves are surprisingly versatile:

**Corrosion Service**... acetic, H<sub>2</sub>SO<sub>4</sub>, HNO<sub>3</sub>, HF... Because valve seats are protected by chemically inert pure Teflon, Tufline valves have unusually long life under the most severe corrosive conditions. They are available in a wide choice of metals and alloys.

**Hazardous Fluids**... pyrofluoric exotic fuels, oxygen, fluorine... A non-flexing auxiliary diaphragm seal within the all-metal-enclosed body affords double protection against leakage to the outside. The four-bolted male-female body cover provides maximum safety.



**Slurries**... plastisols, paints, waste liquors... Uninterrupted flow, absence of in-line cavities and wiping action on the plug prevent build-up of solids and assures operation of Tufline valves where other conventional valves fail.

**Light Gases and High Vacuum**... helium, freon, hydrogen, 1/10 micron Hg vacuum... High density pure Teflon seal, high compression ribbed sealing plus double sealing against outside leakage provides maximum tightness.

**Non-Contaminating Services**... demineralized water, pharmaceuticals, food processing... Absence of all lubricants, ease of cleaning or disassembly, and straight through flow prevent contamination of media being handled.

**Steam-Out Services**... sterilization, flushing... The ability of Tufline valves to maintain seal under temperature fluctuating conditions make them ideally suited.

### IN-SERVICE FLEXIBILITY

We purposely made the Tufline basic body construction easily adaptable to a bottom-entry third port—and additional side ports as needed. Thus you can obtain up to 5-way operation within the original 2-way face-to-face dimensions.

Besides conventional wrench operation, 3" and larger valves have quick operating gearing with a "T" wrench. Their assured operation also makes Tufline valves well suited to all modes of remote control—extended and 45° offset wrenches, chain operation, and hydraulic, pneumatic or electric actuators.

Tufline valves can easily be modified for specialized use. For example, some time ago we furnished specially jacketed valves for both cooling and heating. They performed so well that we have recently

added this design to our standard Continental line.

In short, Tufline valves now offer, within their range of application, fool-proof operation and tight shut-off for a wide variety of process services. All this adds up to new operating efficiency and economy when Tufline valves are used.

### SPECIFICATIONS

Tufline valves, 150# and 300# class, are designed to handle a wide range of media, from hard-to-hold light gases and solvents to heavy slurries and corrosive liquids. They provide trouble-free service over the temperature range minus 150° F to plus 400° F, from high vacuum to 615 psi pressure (depending on temperature).

Built to meet MSS-SP42 specifications, Tufline valves are available with screwed or flanged ends. The flanged-end design (faced as specified) has the same face-to-face dimensions as standard plug or gate valves. Flange and body thickness meet ASA standards.

Sizes from ½"-6" can be furnished in a variety of body materials, including carbon and stainless steels, Hastelloys, nickel, monel, bronze, aluminum and ductile iron.

For additional information write me at Continental Manufacturing Co., 247 Park Ave., N. Y. 17, N. Y. Let me know if you would like to have one of our field sales engineers call.



**TUFLINE**  
PLUG VALVES

CONTINENTAL MFG. CO.  
9216 Floral Ave., Cincinnati 42, Ohio

Offices in principal cities

TEFLON is a registered trademark of E. I. DuPont de Nemours & Co., Inc. T.M. Reg.

Check 1608 opposite last page.

## Here's A Positive Approach to Lower Sealing Costs



**Put yourself in this picture . . .** You're getting "down-to-earth" facts on how you can save money through more efficient sealing methods.

How? A "John Crane" trained field engineer is making a complete survey of your pumps, valves and any other equipment where sealing is required — and is carefully analyzing your needs. He's an expert. You could see that as soon as he went to work.

This service is being given without obligation. The "John Crane" man has even suggested a few trial installations to prove the effectiveness of his recommendations. In the end, you'll be well ahead with sealing methods substantially better than those you are now using.

Get action now! Fill out the card below and a "John Crane" field representative will be at your service. Remember—no obligation!

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111 EAST DELAWARE PLACE  
CHICAGO 11, ILLINOIS

Page 1 of 2

ITEM NO.	DESCRIPTION	QTY.	UNIT	PRICE	TOTAL	REMARKS
1	1/2" x 1/2" x 1/2" O-RING	10	EA.	1.00	10.00	
2	1/2" x 1/2" x 1/2" O-RING	10	EA.	1.00	10.00	
3	1/2" x 1/2" x 1/2" O-RING	10	EA.	1.00	10.00	
4	1/2" x 1/2" x 1/2" O-RING	10	EA.	1.00	10.00	
5	1/2" x 1/2" x 1/2" O-RING	10	EA.	1.00	10.00	
6	1/2" x 1/2" x 1/2" O-RING	10	EA.	1.00	10.00	
7	1/2" x 1/2" x 1/2" O-RING	10	EA.	1.00	10.00	
8	1/2" x 1/2" x 1/2" O-RING	10	EA.	1.00	10.00	
9	1/2" x 1/2" x 1/2" O-RING	10	EA.	1.00	10.00	
10	1/2" x 1/2" x 1/2" O-RING	10	EA.	1.00	10.00	
11	1/2" x 1/2" x 1/2" O-RING	10	EA.	1.00	10.00	
12	1/2" x 1/2" x 1/2" O-RING	10	EA.	1.00	10.00	
13	1/2" x 1/2" x 1/2" O-RING	10	EA.	1.00	10.00	
14	1/2" x 1/2" x 1/2" O-RING	10	EA.	1.00	10.00	
15	1/2" x 1/2" x 1/2" O-RING	10	EA.	1.00	10.00	
16	1/2" x 1/2" x 1/2" O-RING	10	EA.	1.00	10.00	
17	1/2" x 1/2" x 1/2" O-RING	10	EA.	1.00	10.00	
18	1/2" x 1/2" x 1/2" O-RING	10	EA.	1.00	10.00	
19	1/2" x 1/2" x 1/2" O-RING	10	EA.	1.00	10.00	
20	1/2" x 1/2" x 1/2" O-RING	10	EA.	1.00	10.00	

**CRANE PACKING COMPANY**  
4431 Oakton Street, Morton Grove, Illinois (Chicago Suburb)  
We would like to discuss our sealing problems with your field engineer.  
At present our interest is in  
☐ A PLANT SURVEY  
☐ A FEW TRIAL INSTALLATIONS

Company Name \_\_\_\_\_  
 Address \_\_\_\_\_  
 Date \_\_\_\_\_ Signed \_\_\_\_\_



Check 1609 opposite last page.

## CHEMICAL PROCESSING

with which is combined  
PROCESS DYNAMICS  
CHEMICAL PROCESSING PREVIEW  
and CHEMICAL BUSINESS

*For the management team*

*More than 50,000 copies of this issue*

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No. 11

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Editorial Staff—page 6

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CHEMICAL PROCESSING serves members of the Management Team in these industries:

### Basic Chemical and Chemical Processing Industries

Industrial inorganic & organic chemicals (acids, alkalis, plastics, synthetic fibers, explosives, etc.)  
Drugs & medicines  
Soap & cleansing products  
Paints, varnishes, lacquers  
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Fertilizers

Animal & vegetable oils & fats  
Miscellaneous chemicals (cosmetics & toiletries, inks, insecticides, water treatment chemicals, etc.)  
Paper & allied products  
Petroleum, coal, coke-oven products  
Rubber products  
Stone, clay & glass products  
Atomic energy establishments

### Other Industries Utilizing Chemicals or Chemical Processes

Food and allied products  
Textile dyeing & finishing  
Leather tanning & finishing  
Metal & alloys  
Machinery & equipment

Allied products (tobacco, photographic film, instruments, fabricated plastic products, etc.)  
Water treating & purification plants  
Government (including ordnance, missiles, etc.)

### Specialized Services to the Chemical Processing Field

Plant construction consulting firms  
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CHEMICAL PROCESSING





over the editor's  
shoulder



### Good Ideas at low cost

Mr. Executive, how much would it cost you to send a technical man to the headquarters of more than 500 national suppliers of processing equipment, materials and services vital to your operations?

How much to have him take the time to talk with men at each location who could provide ideas and new developments to help improve your product or to increase the efficiency with which it is made?

This would take a bit more than "petty cash," wouldn't it?

But put all these manufacturers side by side for a week in a convenient centralized location and the job becomes easier, much less expensive, more effective over all. This is why the 26th Exposition of Chemical Industries, held two years ago, drew more than 40,000 persons from forty different industries. One-third were executives and more than 35% chemists and engineers.

The 27th Exposition, coming up November 30 to December 4 in the New York Coliseum, bids fair to attract an even larger crowd of visitors looking for things and ideas to help them do their processing jobs better.

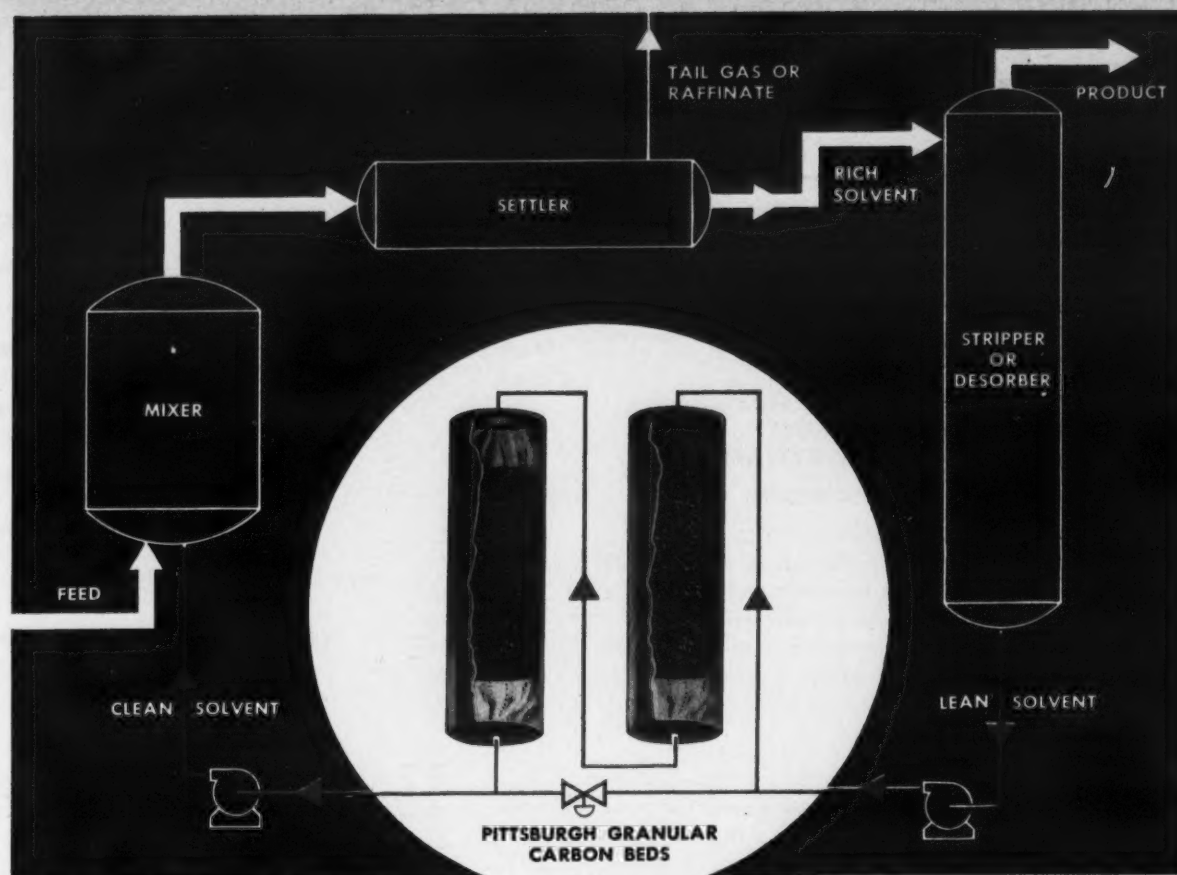
As these Chem Shows get bigger the task of planning an efficient trip through them becomes greater. It's ideal for everyone to visit every booth, but limited time usually prevents that.

CHEMICAL PROCESSING magazine, on page 30 has a report on new developments to be shown at the Show. Getting this to you now gives you a chance to do a little preplanning for your visit.

Oh yes, we'll have a booth there too—No. 880. Hope you will drop in to see us.

*Dana B. Berg*

Managing Editor



## Improve Solvent Extraction and Absorption Efficiency with PITTSBURGH ACTIVATED CARBON

Does your process utilize acids, alkalis, amines, glycols or other costly solvents which must be recirculated for repeated use? If so, you can maintain higher solvent selectivity and efficiency, and eliminate sewerage a side stream by circulating the solvent through a bed of PITTSBURGH Granular Activated Carbon.

In butadiene manufacture, for example, PITTSBURGH Activated Carbon is used to reduce the accumulation of organic contaminants in a recirculating stream of cuprous ammonium acetate.

In the same manner, recirculating streams of amines used in gas purification are kept free of contamination with PITTSBURGH Granular Carbon. Often, it is only necessary to carbon treat a portion of the solvent stream to remove accumulated organic contaminants.

Use of PITTSBURGH Activated Carbon in this manner results in:

1. Increased selectivity and capacity of the solvent.
2. Reduced solvent make-up or cost of reclaiming.
3. Elimination of foaming in evaporators or distillation towers.
4. Reduction of corrosion and maintenance.
5. Improvement of quality of end product.

Our technical representatives will be glad to evaluate and advise whether or not such improvements are possible in your system. • Write today for more information . . . or a visit from a PITTSBURGH technical representative.

\* \* \*

### Send for Booklet

Describes types and various applications of PITTSBURGH Activated Carbons in both liquid and vapor phase adsorption. For your free copy, write to Dept. U.



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Check 1610 opposite last page.



# highlights



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VOLUME 22 • NUMBER 11

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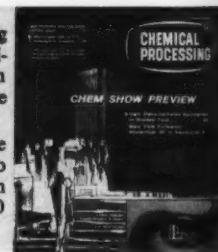
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## THIS MONTH'S COVER

The collective eye of the chemical processing world will reflect the image of New York's Coliseum, beginning on November 30th. The 27th version of the Chem Show will hold forth there until December 4th.

To really get the most out of the Exposition, the visitor needs not just a program but a guide to "What's new?" Such a pre-show peek has been prepared by CP's Editors and starts on page 30 of this issue.



## REGULAR FEATURES

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## Spotlight On People

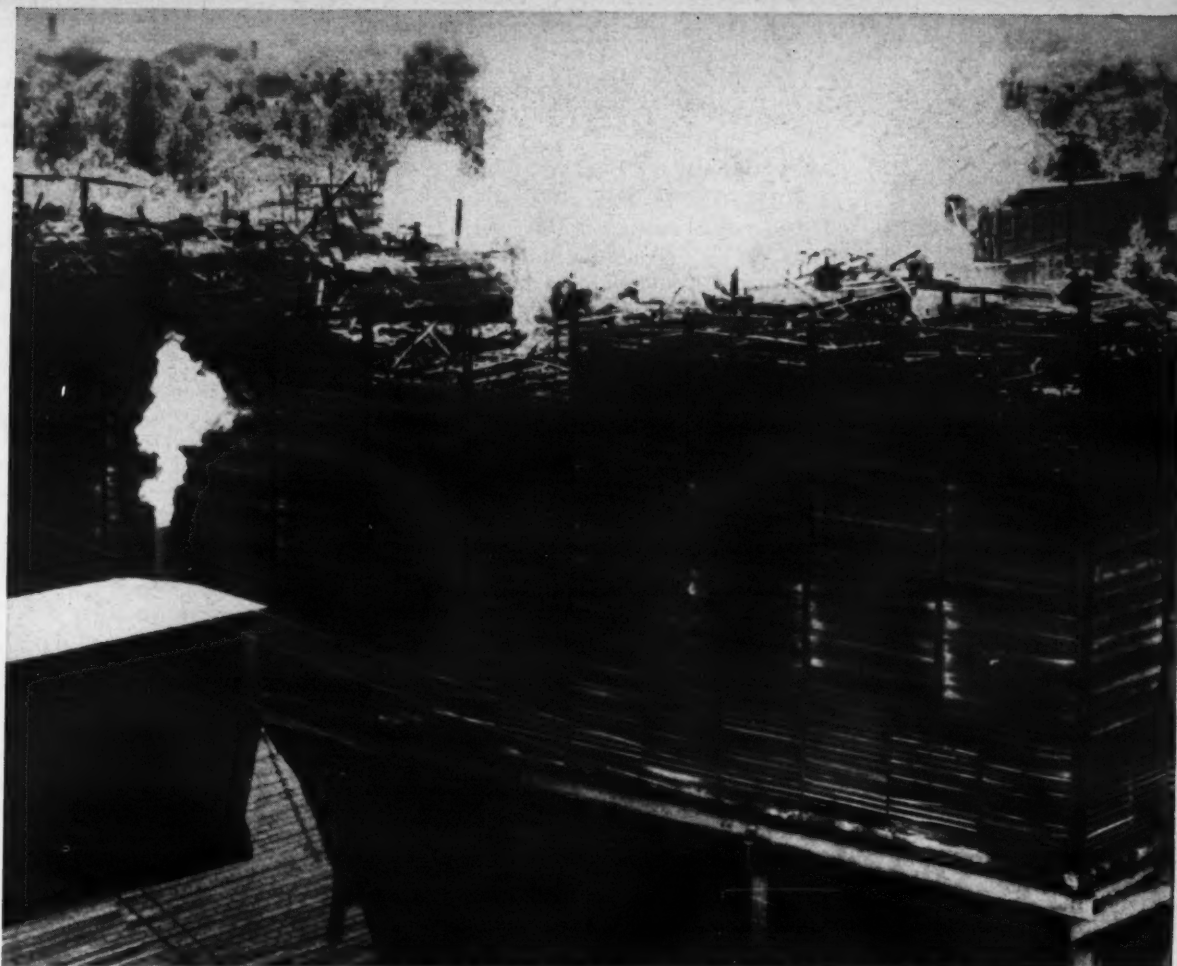
Four men have been appointed to top posts in Celanese Fibers Company, an operating division of Celanese Corporation of America. They are: DR. BRUCE B. ALLEN, vice president — technical director; PETER H. CONZE, vice president and director of marketing; FLETCHER HORN, vice president and assistant to the president, and DAVID TAYLOR, vice president and manager of manufacturing. In another division of the parent company, JAMES W. FLYNN is named sales manager of Celanese Plastics Company.

R. T. McALLISTER is elected vice president of Formica Corporation, a subsidiary of American Cyanamid Company.

At Union Carbide Corporation, ADGER S. JOHNSON, formerly president of National Carbon Company, a division of the parent company, is elected a vice president of the corporation. ARTHUR C. BRYAN is appointed president of Union Carbide Consumer Products Company, a new corporation operating division formed to expand consumer products business. WILLIAM H. FEATHERS is named president of National Carbon Company.

LAUREL G. PARKINSON, recently named general manager — marketing of Amoco Chemicals Corporation, is elected a director.

United States Borax & Chemical Corporation has realigned its management structure and has established five functional departments to take maximum advantage of key personnel's specialized abilities. In the new corporate structure, J. F. CORKILL, former vice president and general manager of the Pacific Coast Borax Division, becomes head of industrial and agricultural marketing. R. T. EDGAR, former vice president for production in the same division, is placed in charge of all company products. D. V. PARKER will continue to head 20 Mule Team products marketing. R. F. STEEL, former vice president in charge of finance and



Fire caused by friction spark destroyed top 6 feet of this cooling tower, severely damaging motors, shafts and gear boxes.

## Protect your water cooling tower from crippling fire with a Grinnell System!

Water cooling towers are essential in many industries today. But cooling towers can, and do, *burn*! Furthermore, fire may strike when the tower not only is shut down, *but even while it is in use*. One insurance company has stated that nearly half its losses involving towers occurred when the towers were in operation!

Why are cooling towers so vulnerable to fire? Because they are largely made of wood. It is true that when the tower is operating most of the wood is wet. But roof and sides can become excessively dry through exposure to the sun. Also, there is a portion of the tower above the cooling water distribution system that is never wet.

Your best protection against an unexpected blaze is a

Grinnell Water Spray or Automatic Sprinkler System. Grinnell will engineer an installation for you that will protect your tower — possibly your entire production program — against fire, no matter how it may start. Common causes of fire include defective wiring, overheated bearings, and lightning. So call in a Grinnell engineer. Let him analyze your needs. Remember, he is well qualified to help you . . . backed by a company with 89 years experience in the fire protection field. Grinnell Company, Providence 1, Rhode Island.

**GRINNELL**  
Fire Protection Systems Since 1870

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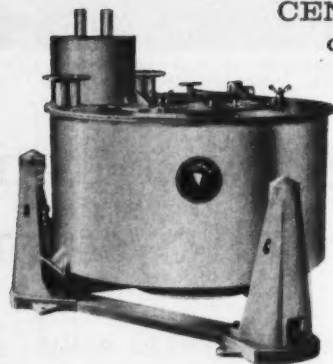


### \*DEWATERING FIBROUS PULPS

to residual moisture of 1% or less? . . .

or medium-to-coarse crystalline solids? The Sharples Conical screen Continuous Dehydrator most likely is the type of Sharples centrifuge best suited for this requirement and there are four sizes from which to choose, covering a range of capacities from a few hundred pounds to 75 tons per hour.

## for all types of solids deliquification\*



### \*NEED A RUBBER-LINED CENTRIFUGE?

or other special lining? The Fletcher Division of The Sharples Corporation offers a complete range of sizes of both batch and automatic vertical basket centrifuges—in the usual selection of metals, plus rubber covering and other linings for special corrosive conditions.

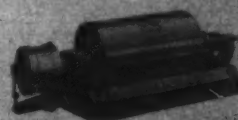
\* The term "Solids deliquification" is recognition by Sharples of the growing number of processes in which non-aqueous mother liquor and/or rinse are required, and to which such time-honored designations as "dewatering" and "dehydration" do not apply. Collectively the five different types of Sharples centrifuges are all-inclusive in function, hence, "solids deliquification."



## THE SHARPLES CORPORATION

Centrifugal and Process Engineers

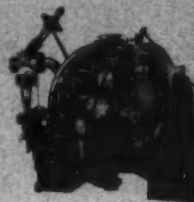
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\* Continuous removal or classification of solid particles from suspensions (4 microns in size upwards).  
*Super-D-Canters*



\* Removal of solid particles from suspensions at pressures to 150 psi. (4 microns in size upwards).  
*Vertical Super-D-Canters*



\* Deliquification and efficient multiple washing of discrete solid particles—at pressures to 150 psi.  
*Super-D-Hydrators*



\* Deliquification of fibrous and medium-to-coarse crystalline solids.  
*Continuous Dehydrators*



\* Broad range dewatering, recovery and washing of solids, liquid extraction and centrifugal filtering of liquids.  
*Fletcher Vertical Basket Centrifuges*



\* Concentration of finely divided or plastic solids.  
*Nozjectors*

### PEOPLE

administration, becomes treasurer and head of the administrative department. DR. D. S. TAYLOR, former vice president and general manager of U. S. Borax Research Corporation, is new head of the technical department.

RALPH M. KNIGHT is named a vice president of U. S. Industrial Chemicals Co., division of National Distillers and Chemical Corporation.

At Allied Chemical Corporation, IRB H. FOOSHEE and I. H. MUNRO are elected vice presidents of manufacturing and marketing, respectively. JAMES G. FOX JR. is named president of the National Aniline Division, succeeding CHESTER M. BROWN, who became president and chief operating officer of the company on September 1. And Dr. L. W. SEIGLE is appointed assistant to the director of chemical sales for the division.

American Mineral Spirits Company announces election of LEON J. BRETON as vice president.

HOWARD PHIPPS JR. is elected to the board of directors and to the executive committee of Western Petrochemical Corporation.

New manager of Archer-Daniels-Midland Company's chemical products division is GEORGE K. NELSON, director of development the last four years. He succeeds BURTON W. SCHROEDER, now administrative vice president.

Food Machinery and Chemical Corporation has formed two new departments to manufacture and market Dapon® (diallyl phthalate) resin and epoxy resins. ROBERT H. MALOTT, formerly manager of planning and control of the Organic Chemicals Department, heads the Dapon Department. The Epoxy Department is in charge of KENNETH H. WANDERER, formerly controller of the Chemical Divisions. R. H. F. DADE is appointed general manager of the chemical facility FMC will design, construct and operate for the Army Chemical Corps at Newport, Ind.

CHEM SHOW  
booths  
485 and 459

Check 1612 opposite last page.

CHEMICAL PROCESSING





## Watching Washington

### Armed Services Look to CPI To Provide Space-age Needs

CPI will have an even more substantial customer in Uncle Sam in the future as things chemical grow in importance.

At a recent meeting of the Armed Forces Chemical Association, spokesmen of the Army, Navy, Air Force, Marines and government research agencies told 250 executives in attendance that the military services look to them for answers to many space-age problems.

While plastics have found their way into missiles, space vehicles and modern weapons systems, G. P. Sutton, chief scientist, Defense Department's Advanced Research Projects Agency, reported that rocket engine manufacturers continue to search for better plastics with good resistance to humidity and temperature variations.

A need exists, he said in citing an example, for a plastic material which can be used as a gasket between flanges and in rotating or moving equipment such as valves and pumps. No soft "hardware" has yet been found, Sutton claimed, which can withstand the corrosive action of concentrated fluorine used in rocket engines.

Plastics have further use as electrical insulators in missile components and military devices, such as satellite communications equipment, radar and space-borne computers, Sutton said.

Materials are needed that will withstand the rarified environment of outer space, Sutton pointed out, adding that quick-evaporating exterior materials will not work in a high vacuum. This puts a premium on the low-vapor pressure variety, he said.

#### ARPA's 'Must List'

What else is on ARPA's "must-have" list? Here are a few:

1. Paints, plastics, covers or paint binders that are insensitive to strong ultraviolet radiation over a long period of time.

2. Chemical products for fuel cells to produce electricity. This would mean a complete chemical system energized by the sun for space stations.

3. New metals that can withstand high-speed gases of 5500°F.

Sutton took the group on an imaginary trip to the moon to envision a chemical manufacturing plant using solar or nuclear energy to transform some of the oxides (if they exist) on the moon's surface, extract the oxygen and liquefy it so that it is available for breathing and for propellants for the return journey to earth.

#### Many New Problems Seen

"A host of interesting new chemical problems will confront us involving raw materials that might be found on the moon," APRA's chief said.

Lt. Gen. Arthur G. Trudeau, chief of Army research and development, paid tribute to the "tremendous breakthroughs and achievements of the chemical industry." But he cautioned it would be well if some ideas once rejected as impractical were dusted off and reviewed in light of today's discoveries and tomorrow's potentials.

General Trudeau discussed the revived interest in chemical weapons, particularly those which are only temporarily incapacitating. He described two types: One psycho-chemical in action which upsets normal behavior patterns, causing either apathy, fear, disorientation or person-



Apply Cementable Teflon to hoppers, mixers, feeders, chutes, packaging machines. Chemically-inert Teflon moves powders and mixtures swiftly, freely. Prevents material build-up without vibration equipment or manual attention.

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*Plastics Division of*  
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Check 1613 opposite last page.



**1,322 COLORS** of paint are offered by every paint dealer featuring the Colorizer Paint Color System. Adding Colorants to the base paint is a quick, easy, clean job—thanks to Colorizer's tough new "Colorpods" of "Scotchpak" Heat-Sealable Polyester Film.

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"Scotchpak" is now available in roll-stock widths up to 50 inches—from 2 mils to 4.5 mils thick, ready for printing—if you desire. It can be easily handled on conventional bag-making and filling equipment.

Our Customer Service organization is ready to work with you to show you how "Scotchpak" can solve your film fabrication and packaging problems. For complete information, write Film Products Group, Dept. CAE-119, 3M Company, St. Paul 6, Minnesota.

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... WHERE RESEARCH IS THE KEY TO TOMORROW



Check 1614 opposite last page.

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## WASHINGTON NEWS

ality withdrawal; the other resulting in temporary physical incapacitation.

Maj. Gen. M. C. Demler, Air Force director of R & D, asked CPI to come up with "vastly improved" metallic and non-metallic materials to be used for structure fabrication, propulsion devices and specialized components of aerospace vehicles.

He emphasized one area of chemistry which, he said, must keep pace with or keep ahead of others—the development of techniques for chemical analysis.

### Startup Due Next Year

By next year, General Demler said, one full-size chemical plant should be in operation with the expectation that it will produce silicon with impurities limited to less than one part in six billion. Of course, he pointed out, that requires corresponding analytical accuracy.

Man and his individual problems on the battlefield were discussed by Marine Corps Brig. Gen. R. E. Shell. What the Marines need in this area, he said, are lightweight plastic and fiber glass armored clothing, inexpensive disposable field equipment, disposable combat clothing and food products that can be eaten without mess gear.

The Navy Department's Bureau of Ships, among other things, is looking for paints, preservatives and coatings to withstand deterioration.

### Action due on tax deferral from foreign business

Watch for further action next session of Congress on a measure which provides for deferral of tax on business income from foreign sources as long as it is re-invested abroad. Late in the first session, the House Ways and Means Committee gave tentative approval to a bill favored by industry (H.R. 5). The committee is preparing a revised draft incorporating amendments and making technical improvements.



## Bigger Splurge in Petrochemicals Seen as Aiding Refiners' Profits

**WILLIAM R. WHITE**, Market Analyst  
Hornblower & Weeks

Of numerous industrial groups participating in the sustained stock market recovery from recession lows, few have outperformed chemicals. Outstanding financial progress may be attributed to steady growth in demand for chemicals generated by the vigorous rebound in industrial activity.

Not all segments of the market have enjoyed such a high degree of prosperity. Representative petroleum stocks, for example, have drifted in the doldrums even though many integrated producers have attained a strong foothold in the chemical field.

In the light of this year's experience, it would not be surprising to find major petroleum companies expanding petrochemical activities in an effort to combat adverse effects of narrow margins on refined petroleum products.

### Better Results Seen

All indications point to more satisfactory results in such upgraded products than in motor fuels or heating oils. Government surveys afford a basis for projections of an up-trend in consumption of petrochemicals at an annual rate approximating seven percent, or about twice the rate being experienced in gasoline.

Among the best known petroleum companies, whose shares have remained depressed while chemicals have been advancing, several have undertaken ambitious petrochemical projects.

### Nitrogen Fertilizer Producer

Phillips Petroleum, for example, has attained first rank in the oil industry as a producer of nitrogen fertilizers, and is recognized as a principal source of cyclohexane. Output of materials required for production of plastics has

increased significantly.

In short, Phillips has capitalized on the favorable growth trend in chemicals and its strategic position in raw materials.

### Earnings Retarded

Depressing effects of an oversupply in crude oil and refined products have retarded earnings this year. Net profit, however, in the first six months rose to \$1.55 a share from \$1.06 a year earlier on a sales increase of almost 17 percent. Dividends are being paid at a rate of \$1.70 a share annually.

Shell Oil Company has aggressively undertaken exploitation of markets other than the traditional outlets for gasoline and lubricating oils.

It has marketed a wide variety of solvents in recent years. Other products include hydrogen peroxide, glycerine, epoxy resins, insecticides and soil fungicides.

Despite handicaps common to most refiners and marketers, Shell was able to boost earnings in the first six months to \$2.28 a share from \$1.78 in the corresponding 1958 period on a sales increase of approximately 12 percent. Dividends have held at an annual rate of \$2 a share for three years.

(For further information on chemical stocks write Hornblower & Weeks, 40 Wall St., New York 5, N. Y.)

Check 1615 opposite last page.

**DAY**

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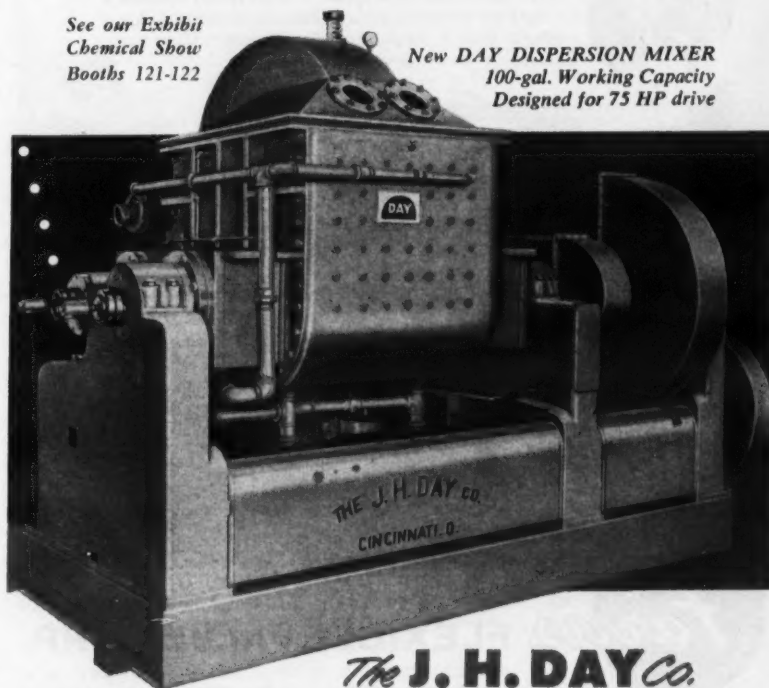
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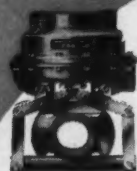
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Check 1616 opposite last page.



In the Process Industries—

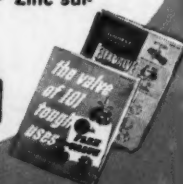
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Check 1617 opposite last page.



## letters from readers

### Readers Air Views on Depreciation

Government depreciation and tax policies are harming American Business, T. C. Davis stated in September CP (page 30). His remarks brought quick response from readers. The editors are pleased to present herewith some readers' views and hope that others will send in opinions on this important subject.

#### Fixed assets appraisal held good compromise

Dear Sir:

Here is a suggestion on changing the government depreciation policy that would make a fair compromise. It is my personal suggestion, and in no way is intended to represent my company's views.

A proposal involving the fewest changes has the best chance of success. Let the accountants and Uncle Sam keep their straight line methods. Industry cannot expect depreciation based completely on replacement cost. There are other factors involved.

For example, when the accountant's books give a zero worth, there is still some real value to the equipment or buildings, if only for junk. Furthermore, it would be unusual to replace equipment and buildings exactly.

New processes and procedures call for different facilities. The added costs are offset by labor saving. So, there are arguments on both sides, leading to a suggested compromise solution.

#### Five-year Appraisals

My proposal is that a plant owner should have the opportunity to have his fixed assets appraised every five years. The appraisal would be certified by appraisal engineers who are approved by income tax authorities. The percentage remaining to be depreciated is the ratio of the number of years remaining to the total life. This percentage of the new appraisal is the basis for depreciation for the next five years.

For example, take an original value of \$15 million for equipment having a 15-year life. At the end of five years,

there is \$10 million to be depreciated, and two-thirds of the life yet to go. The new appraisal of replacement value is \$21 million. The new remainder to be depreciated is \$14 million, or \$1.4 million per year for the next 10 years.

At the end of the second five years, an appraisal of \$24 million for replacement value is given. The remainder to depreciate is \$8 million. For the 15 years, the owner was allowed depreciation of \$5 million plus \$7 million plus \$8 million, or \$20 million total.

Compare this to \$15 million allowed on the present basis and say \$26 million replacement value at the end of the equipment's life. In this case, it was almost a 50-50 split.

J. ALBERT CURRAN  
Senior Engineer

C. F. Braun & Co.  
Alhambra, Calif.

#### Industrial leaders blamed for plight

Dear Mr. Vaaler:

The article by Thomas C. Davis was very interesting and perturbing. He classes himself as a pessimist—wears both belt and suspenders. If things are as bad as he pictures them, we had better roll up our training sleeves in American industry and educate the average industrial employee or many of us will have no need for belt or suspenders. We will have nothing to hold up.

The accountants and legislators are responsible for a small portion, if any, of our plight. The prime responsibility is with the industrial leaders who permitted the tax laws to become so obsolete. No representative is as powerful

as those he represents.

So if our legislators are not giving us laws that will further the cause of the American economy, let's get some new legislators. The most democratic way to do this is for industry to present the true picture of the corporate tax laws to employees (ALL of them) and the right caliber legislators will be on their way to Washington.

The American economy will not only be sound in 1967 but also in 2067 if the backbone of American industry (the average American industrial employee) is kept abreast with the legislative picture as well as he is kept abreast with other developments affecting his job and his standard of living.

Whether this letter goes to Washington or not, I would appreciate it being forwarded to Mr. Davis because I feel he is in a position to start the ball rolling in one industry and maybe others will follow suit.

J. A. McDONNELL  
Foreman

E. I. du Pont de Nemours  
Orange, Texas

#### **Liberalized cost plan seen as inflationary**

Dear Mr. Vaaler:

Thomas C. Davis' article is indeed a provocative presentation. I am sure that 95 percent or more of letters you receive will agree with him that depreciation policies should be liberalized. However, I disagree with that proposition, and strongly enough to overcome my inertia against letter writing.

Contrary to Mr. Davis' opinion, I believe that depreciating more than the original cost of plant and equipment would be inflationary. For example, assume a company determines a selling price by marking up the corresponding cost 25 percent. Additional depreciation is an additional cost and thus begets a higher selling price. Over-simplified? Possibly so. But how many companies will reduce their margins in response to a lib-

eralized depreciation policy? I think the answer would prove to be zero.

Secondly, if we will recall the days of rapid amortization certificates only a few years ago, we should also recall that some companies rushed into expansions that were extremely marginal merely because they could get certificates of rapid amortization. Some executives apparently believed that rapid amortization somehow meant greater profits or that it made a given project less risky.

#### **Draws Analogy**

This situation is analogous to the executive approving a questionable project just because he knows "Uncle Sam will pick up 52 percent of the tab so it only costs us 48c out of each dollar we spend." That, of course, is highly fallacious reasoning; but, sad to note, it typifies the thinking of many executives today.

Accordingly, I believe that this quirk of human nature would lead some companies into unsound expenditures, merely due to the existence of liberalized depreciation.

Mr. Davis expressed considerable doubt about the ability of American industry to provide enough modern facilities to supply the needs of our population by 1967. That statement has a very hollow sound. It has been repeated by one or another of our industrial leaders annually — or even monthly — for many years.

In 1951, someone doubtless made the same forecast about industry's inability to meet 1959's needs. Yet, rather than being short of supply, nearly every chemical of commercial importance is being adequately produced; furthermore, supply exceeds demand in most cases.

Industry has continued to replace outmoded equipment by applying depreciation reserves plus retained earnings (or via debt financing) without "driving away investors," as forecast by Mr. Davis. Today there are more investors than ever before, and it is safe to predict that the number of



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in any quantity  
you can use!*

The highest-quality, volume-production Cyclohexanone offered . . . that's still the seven word story of NADONE. Minimum purity is now 99.7% but individual shipments regularly better this high standard.

Our Hopewell, Va. plant employs an advanced direct continuous process developed by National Aniline research. It is integrated back to basic raw materials within the Allied Chemical group and well located to serve the resin, plastics, coatings and chemical industries. Drum stocks also available in principal cities.

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Check 1619 opposite last page.

#### LETTERS

investors will continue to grow at a faster rate than our population.

In spite of Mr. Davis' stimulating presentation, I think he has reached a conclusion that is diametrically opposed to what it should be. Anything more liberal than original cost depreciation, even the sum-of-the-digits method, is bound to be inflationary.

DONALD H. THOMAS  
St. Paul, Minn.

#### U.S. senator halls CP

Dear Editor:

Thank you so much for the kind article in the August issue (Watching Washington, page 13).

I have become increasingly concerned with the lack of exchange on scientific information. I hope your article, appearing as it did in a scientific and technical journal, reaches those scientists and technicians who are most affected.

THOMAS C. HENNINGS JR.  
United States Senate  
Washington, D. C.

#### A-waste article author likes land burial idea

Dear Sir:

I read with interest the letters received commenting on my article (July CP, page 23).

It is obvious that everyone agrees that we must be cautious in disposing of atomic wastes, but that a difference of opinion exists on just how cautious. It is, of course, my stated belief that present regulations tend to be too restrictive.

The degree of restriction, and its economic burden do vary from licensee to licensee and what may be but a minor inconvenience in one case

For more information on product at right, specify 1620 . . . see information request blank opposite last page.

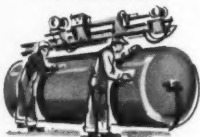




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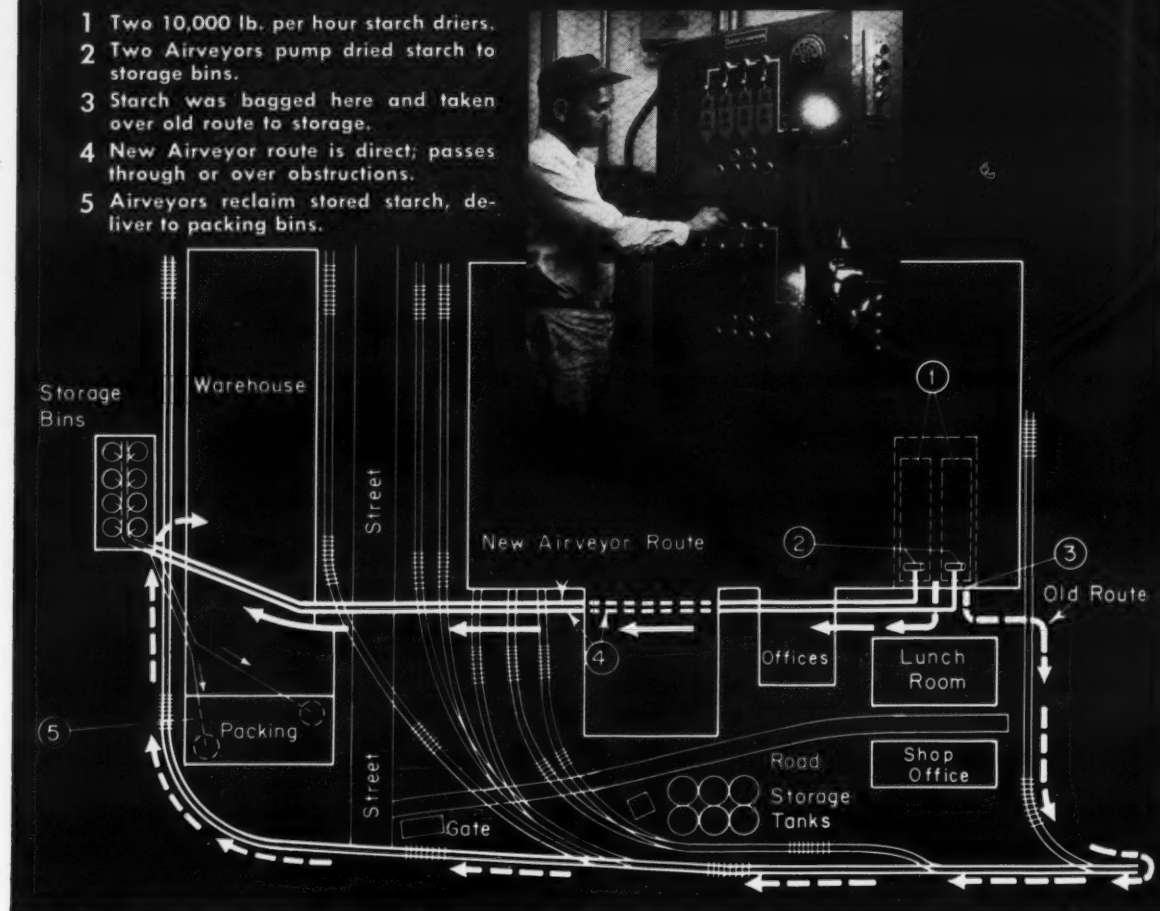
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## FULLER pneumatic conveying system increases production without plant expansion

To increase production, the Union Starch and Refining Company's Granite City, Ill., plant first needed to expand their materials handling system. But a complete revamping of bagging and warehouse operations was impossible because there was no space available for necessary new buildings.

An Airveyor® System, engineered and built by Fuller, was the answer. Airveyor's extreme flexibility allowed it to be set up through walls, along sides of buildings, over streets, on roofs and up inclines. At Union Starch, the total

distance covered is 800 feet, with a number of 45 degree and 90 degree bends in the line.

The Fuller Airveyor system transports the starch in two phases, from the driers to the storage bins and from the bins to receiving hoppers over the bagging machines. Flow is controlled automatically through control panels located in the drier room and at the bagging machines. Other controls are also provided at the panels for automatic operation of components such as feeders,

blowers, conveyors and filter-receivers. Besides being easily installed and automatically controlled, the Fuller system reduces both the amount and the expense of handling. Additional savings are made possible by Airveyor's self-cleaning facility, which greatly reduces maintenance costs.

Why not work with Fuller to design an automated pneumatic materials handling system that will help you cut costs and increase production? Write today for complete details.

A-280  
1958

For details on the Fuller product line, see Chemical Engineering Catalog.



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Check 1621 opposite last page.

## LETTERS

may well prove to be a restrictive limitation in another.

The real solution lies in the research program outlined in the article, and it is my hope that this article will serve to bring such a program closer to realization.

I was pleased with the level of response which my article elicited, and in particular the letter from Mr. Luedecke of the AEC (September CP, page 14). The program outlined for establishment of regional land burial areas is most desirable, and should go far toward reducing the cost of radioactive waste disposal.

S. S. AUCHINCLOSS  
President

Tracerlab Inc.  
Waltham 54, Mass.

### Carbon tetrachloride article proves popular

Gentlemen:

The enclosed clipping ("Hit poisoning on new front") came from page 3 of the July issue of *CHEMICAL PROCESSING*. Would you please either send me the name of the research team that did this work or forward this letter to them?

Our company put out a little pamphlet on the literature review of the "Toxicity of Carbon Tetrachloride." We want to keep it up to date and I certainly want to include this piece of information.

WANDA L. CAMPBELL  
Director of Research  
Chemicals & Materials  
Corporation  
Terre Haute, Ind.

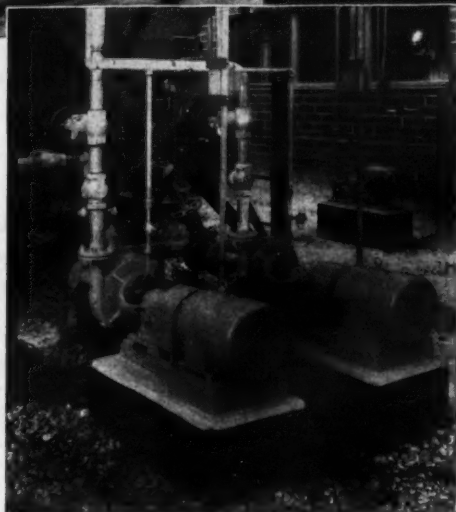
Dear Editor:

A member of our technical staff has pointed out an item in the "That's Interesting" section of your July issue about which we would like to receive more information.

The item dealt with a two and a half-year study of the toxic effects of carbon tetrachloride by two University of Michigan scientists. We would appreciate any information



Above — "Buffalo" Single Suction Full Ball Bearing Pumps, stainless steel construction, handling sodium chlorate.



At left — "Buffalo" Single Suction Pumps of stainless steel construction handling hydrogen peroxide bleach.

## CORROSION— CONTAMINATION CONTROLLED WITH "BUFFALO" PUMPS

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Properly applied, these pumps can cut your liquid mov-

ing costs, reduce down-time due to pump failure and improve quality control where contamination may be a factor.

For your tough liquid moving jobs, phone or write your "Buffalo" Engineering Representative or write direct. Tell us the liquid you want to pump and we will be pleased to suggest the best material of construction for the job.



**BUFFALO PUMPS** DIVISION OF BUFFALO FORGE CO.

524 Broadway Buffalo, N.Y.

Canada Pumps Ltd., Kitchener, Ont. Sales Representatives in all Principal Cities

**A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID**

Check 1622 opposite last page.



# SH·H·H!

TURN QUIETLY TO PAGE 189

**U.S. Flex**  
at **WORK!**

but  
Specifications  
**Classified!**

Photo of the Atomic Sub U.S.S. TRITON courtesy of United States Navy and General Dynamics Corp.



A tough Navy job!  
The assignment: meet  
the exacting and rigid  
requirements for auxiliary steam  
lines in an A-Sub! U.S. Flexweld Hose did it!  
This same U.S. Flexweld Hose serves you and  
other industries day-after-day in commercial use  
at no premium for exceeding your specifications.

Write us today about your tough problems.  
Give our engineers all the facts.

**U. S. FLEXIBLE TUBING CO.**  
219 MAIN STREET, BARTLETT, ILLINOIS

Check 1623 opposite last page.

## LETTERS

you can give us on the people who conducted this work or any source of additional information.

F. A. WOOLFLEY  
Plant Manager  
Stauffer Chemical Company  
Niagara Falls, N. Y.

Gentlemen:

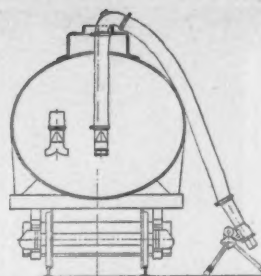
A discussion of toxic effects of carbon tetrachloride appears on page 3 of your July issue. I would be very grateful if you could help me identify the scientific publication on which this story is based.

ALEXANDER C. FINLAY  
Assistant Director  
Biochemical Research  
and Development  
Chas. Pfizer & Co., Inc.  
Brooklyn 6, N. Y.

(Editor's Note: These are only a few of the letters received commenting on this story. The research team responsible for the study consists of Deane N. Calvert and Theodore M. Brody, Pharmacology Department, University of Michigan, Ann Arbor, Mich.)



"Push this button and it starts, this one and it stops. But to get the job, I had to have a minimum of four years' experience and a high school education."



TANK CAR is easily freed of fumes for workers' safety.

## KEEP AIR FRESH

in confined places  
with COPPUS

Design "A" Ventilator

Improve workers' safety—health—comfort—efficiency. Get rid of dangerous gases, fumes, stagnant air. Coppus Design "A" Ventilator ventilates tanks, tank cars, drums, vats, underground cable manholes, pipe galleries, airplane wing compartments, fuselages. For complete information, write Coppus Engineering Corporation, 391 Park Ave., Worcester 2, Mass. Sales Offices in Thomas' Register.

Other "Blue Ribbon" Products in Chemical Engineering Catalog, Refinery Catalog, Best's Safety Directory and Mining Catalogs.



CHEMICAL STILL is here ventilated while being repaired.

and the quality of ANOTHER  
**COPPUS**  
"BLUE RIBBON" PRODUCT

Check 1624 opposite last page.

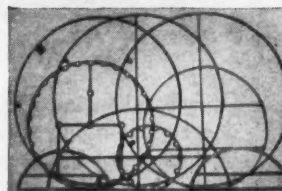
## For Dependable GASKETS

Specify **CHICAGO-WILCOX**



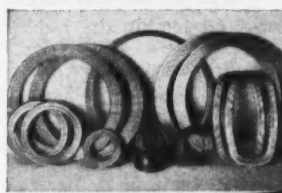
### RING GASKETS

For ring-type flanged joints in high pressure lines. Made of soft iron, standard steel alloys or any non-ferrous metal to any desired cross section. Ask for Bulletin 563.



### HEAT EXCHANGER GASKETS

Made in any size or shape needed in double-jacket type. Also cut from solid metal or sheet packing. Ask for Bulletin 564.



### CORRUGATED METAL GASKETS

Plain or jacketed type. Made of ingot iron, aluminum, stainless steel, copper, brass, nickel and monel in all sizes and shapes. Ask for Bulletin 565.

**CHICAGO-WILCOX**  
MFG. CO.

**Prompt Deliveries**  
7717 So. Avalon Avenue  
Chicago 19, Illinois

Check 1625 opposite last page.

CHEMICAL PROCESSING

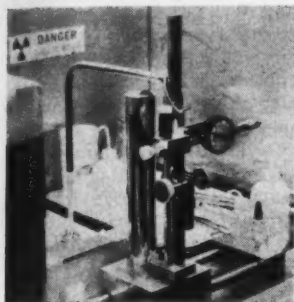


## nuclear notes

Significant news about  
atomic energy

### Precision device speeds radiochemical tests

Hydraulic micro-pipetter has been developed which has high levels of accuracy and convenience for radiochemical determinations. The instrument, designed for use as a microburet and for precisely



Device is accurate to within two percent for one lambda samples, ¼ percent for 100 lambda samples

aliquoting radioactive solutions, can measure samples as small as one lambda (0.001 ml) and has maximum capacity of one ml. Device is accurate to within two percent for one lambda sample, and to ¼ percent for 100 lambda samples.

(Further information about micro-pipetter may be obtained from Nuclear-Ohio, Inc., 27105 Knickerbocker Rd., Bay Village, Ohio.)

Check 1626 opposite last page.

### AEC extends contract with Union Carbide

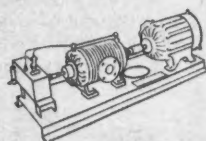
Union Carbide's cost-plus-fixed-fee contract for the operation of four major AEC facilities has been extended until June 30, 1964. Union Carbide Nuclear Company, division of Union Carbide Corporation, operates two large production plants plus a research and development laboratory at Oak Ridge, and the gaseous diffusion plant at Paducah, Kentucky.

# Waste Handling...Presolved!

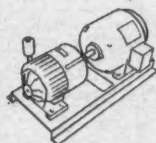


## Gases and Vapors

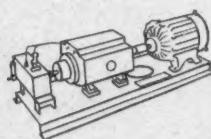
Waste and toxic gases • vapor recovery and recondensation • vacuum distillation • gas blowing • low vacuum • refrigerants



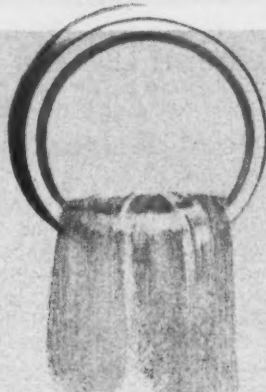
Air Cooled Units



Fan Cooled Units

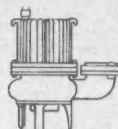


Water Cooled Units



## Clear Liquids

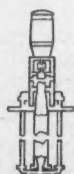
Surface drainage • tank car unloading • process wastes • viscous liquids • acids: sulphuric, hydrochloric, acetic • spent caustic brine • cyanides • tank farm drainage



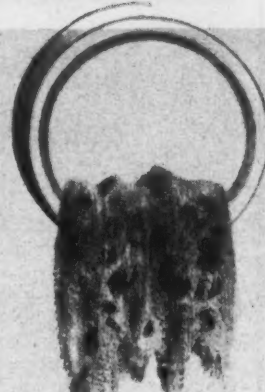
Submersible Pumps



Series 3000



Unique Designs

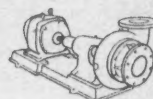


## Slurries

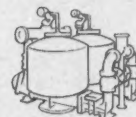
Liquids with ashes, fly ash, cinders, coal particles, catalysts, coke, sand, glass • tar • paint • pigments • adhesives • abrasives • molten sulphur • cane juice • black liquor



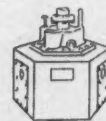
Series 8000



Series 6000



Shone® Ejectors



Pneu-Pumps

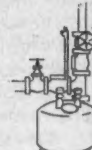


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Heavy, bulky, dry materials • acid slurries • sand • ashes • powdered coal • cracking catalysts • sludges • pulp



Transporter



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# YEOMANS



Pumps and Waste Treatment Equipment

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P-5924

Right now you may be puzzling over a particular waste handling job—which type of pump to use and whether pneumatic or electric; corrosion problems; reclaimable materials; precautions for hazardous wastes; and a dozen other considerations. Handling wastes is tricky, takes a know-how all its own.

For 61 years, Yeomans has been solving waste and drainage problems throughout industry. Once in a while, Yeomans engineers bump into a new twist, but usually the job is one that has been worked out time and again.

Chances are, your own problem is already solved. Why not contact your Yeomans engineer-representative and find out. He brings you a wealth of experience, plus types of equipment unique in the field. If you don't already know him, look in Sweet's Catalog or in the yellow pages of the telephone book under "Pumps."

Check 1627 opposite last page.



**Radiation-resistant rubber for nuclear reactors**

Radiation-resistant polymer has been developed that can be used in the fabrication of seals for atomic reactors and other nuclear applications. Product does not act as a barrier and when exposed to radiation, retains most of its original characteristics. The polymer was originally developed for use with pneumatic seals for entrance locks on reactor at Wright-Patterson Air Force Base.

(Further information about Presray compound 1704 may be obtained from Presray Corporation, subsidiary of Pawling Rubber Corporation, Pawling, N.Y.)

Check 1628 opposite last page.

**Reactor plant accessible 30 min after shutdown**

Reactor shielding system installed on the nuclear-powered ship N. S. Savannah, will make it safe for personnel to perform maintenance on the plant only 30 minutes after shutdown. Reactor is enclosed in a cylindrical primary shield consisting of an inner cylinder of water, 33" thick, and an outer shell of lead ranging in thickness from one to 4".

Water, concrete, lead, and polyethylene make up the secondary shield enclosing the entire reactor plant. It is the chamber formed between the inner shield and the secondary shield that will be accessible to personnel 30 minutes after shutdown.

**Radioactivity decay rate slide rule**

Slide rule for calculating level of radiation after a nuclear explosion is available. The plastic calculator will also figure activity of radioactive iodine, gold, and phosphorus after elapsed periods of time. Device retails for \$10.00 and may be obtained from Graphic Calculator Company, 633 S. Plymouth Court, Chicago 5, Illinois.

See why ALCOA ALUMINUM makes a good design habit

**Requirement: Low-cost, corrosion-resistant piping with high bursting strength**

**Key to good design: Specify Alcoa Aluminum alloy piping**

Where product protection, corrosion resistance and high bursting strength are of foremost importance in a process, aluminum piping is the answer. ALCOA® Aluminum Pipe is the least expensive for doing the job most satisfactorily. It does not catalyze the decomposition of many sensitive chemicals as other metals do. It resists attack by materials within the pipe, as well as by corrosive environments outside. And its clean, easily maintained appearance is ideal for food processing plants where sanitary conditions are important.

With ALCOA Aluminum Pipe you also get a smooth, low friction surface, high thermal conductivity and nonsparking characteristics . . . all highly desirable qualities.

In ultra-low temperature applications, ALCOA Aluminum Pipe retains its excellent physical properties without embrittlement. Tests to as low as -423°F show it actually grows in strength as the temperature drops. That's why it is specified for tonnage oxygen, nitrogen, hydrogen and helium service.

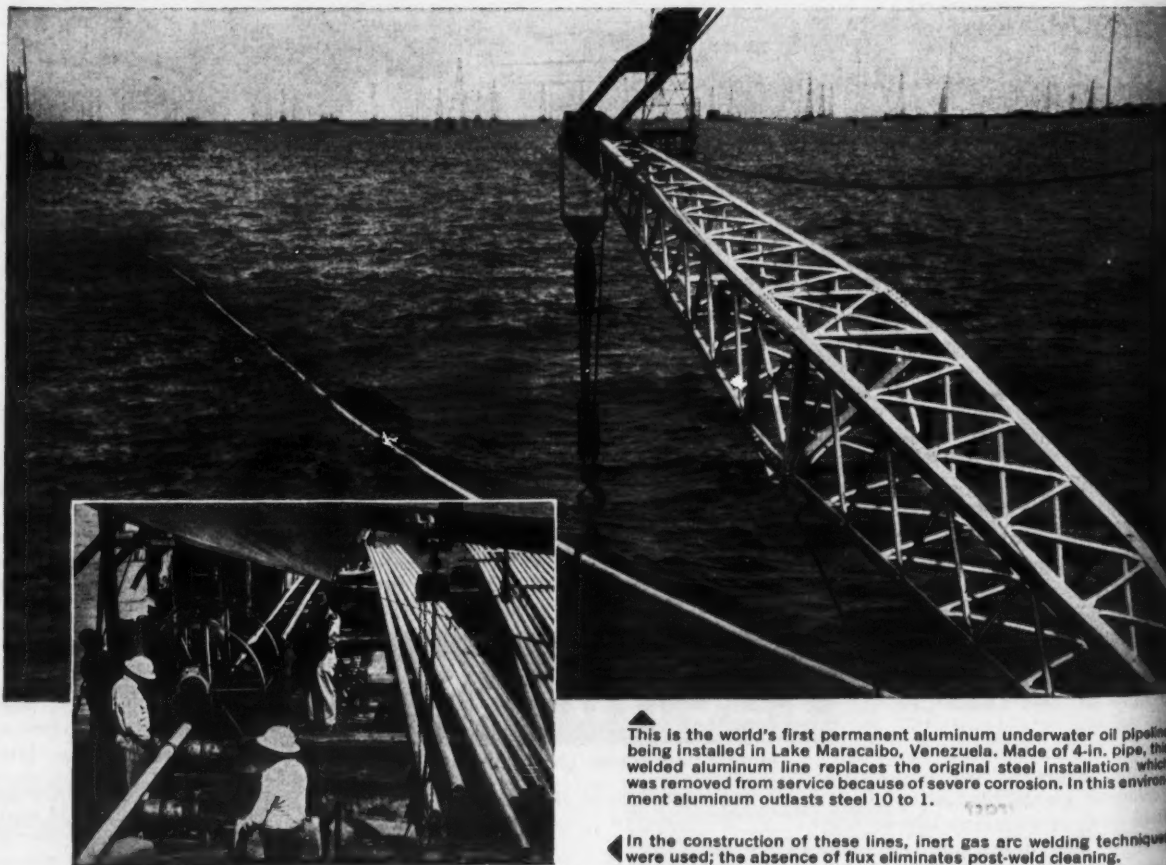
ALCOA Aluminum Piping is regularly produced in ASA sizes from 1/4 in. through 12 in., and in a variety of alloys and

temper, some as strong as low carbon steel. Seamless pipe in sizes up to 20 in. in diameter is available on special order.

ALCOA engineers have worked closely with all segments of the process industries for over 40 years, and can help you specify the aluminum alloy pipe best suited for your process application. ALCOA's unparalleled experience in this field is available to you for the asking. Write to the address on the coupon, stating your requirements as specifically as possible. ALCOA's development engineers will welcome the opportunity to work with you on your problems.

You also can take advantage of the wide selection of free ALCOA literature on aluminum for process piping and other process applications. Simply check the booklets you want on the coupon and mail to the address indicated. ALCOA will forward your material promptly and without obligation.

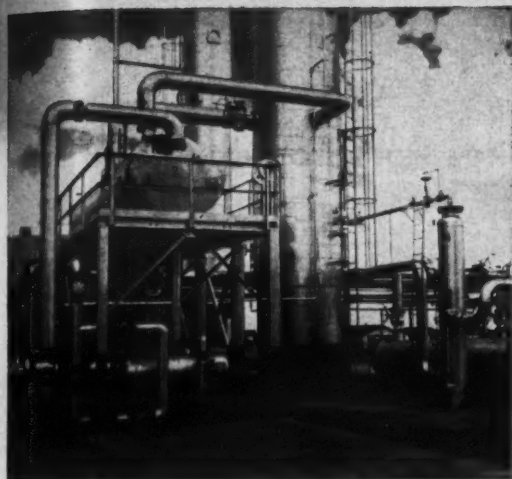
During 1959, ALCOA will conduct engineering conferences in a number of major cities on process industries applications of aluminum. Contact your nearest ALCOA sales office for full particulars and dates.



This is the world's first permanent aluminum underwater oil pipeline being installed in Lake Maracaibo, Venezuela. Made of 4-in. pipe, this welded aluminum line replaces the original steel installation which was removed from service because of severe corrosion. In this environment aluminum outlasts steel 10 to 1.

In the construction of these lines, inert gas arc welding techniques were used; the absence of flux eliminates post-weld cleaning.

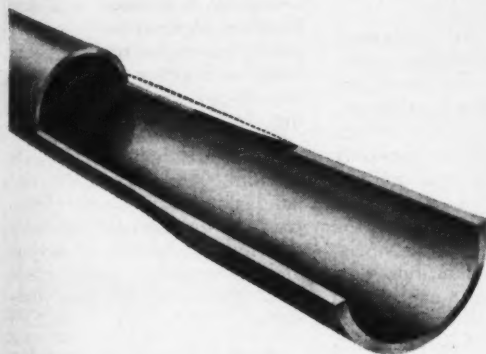




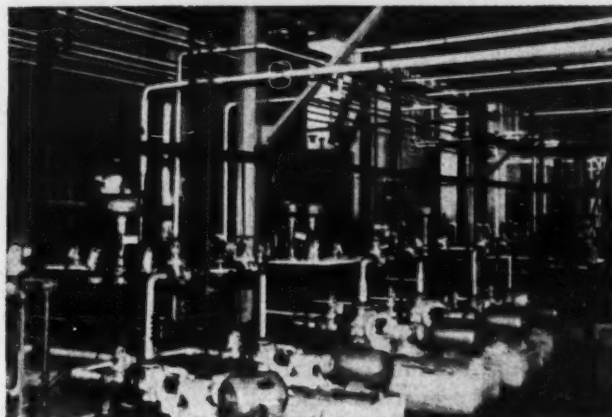
Corrosion and product contamination problems were solved by the use of aluminum in this processing plant. Alcoa Aluminum provides the lowest priced pipe able to resist the action of vinyl acetate and other corrosive liquids such as fuming nitric acid, hydrocyanic acid, acrylonitrile, etc.



Highly resistant to  $H_2S$  and  $CO_2$ , aluminum pipe has been proven in service in gas purification plants.



Alcoa's new UNISTRENGTH Pipe cuts cost, cuts weight with no sacrifice in bursting strength. The secret: wall thickness is reduced everywhere but at the ends where it is needed for joining. This compensates for the local reduction in strength caused by the heat of welding on popular heat-treatable pipe alloys. Available in a range of sizes with ends matching uniform wall pipe of the same size and ASA schedule number.



Naval store plants find aluminum pipe and Unitrace ideal choices because they do not discolor or downgrade resin and other pine products.

Aluminum Company of America  
872-L Alcoa Building, Pittsburgh 19, Pa.

Please send me the following literature on Alcoa Aluminum for piping, fittings, and many other uses in the process industries.

- |   |   |
|---|---|
| <input type="checkbox"/> 10197 Aluminum Pipe and Fittings   | <input type="checkbox"/> 20272 Aluminum Alloys for Handling High Purity Water |
| <input type="checkbox"/> 10460 Process Industries Applications of Alcoa Aluminum  | <input type="checkbox"/> 20268 Resistance of Aluminum Alloys to Fresh Waters  |
| <input type="checkbox"/> 20849 Resistance of Aluminum Alloys to Weathering and Resistance of Aluminum Alloys to Chemically Contaminated Atmospheres | <input type="checkbox"/> 20935 Designing to Prevent Corrosion                 |
|   | <input type="checkbox"/> 10415 Welding Alcoa Aluminum                         |

Name \_\_\_\_\_

Company \_\_\_\_\_ Title \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

Check 1629 opposite last page.

### Study use of sulfur as reactor coolant

Aerogel-General Nucleonics is conducting work to determine feasibility of using boiling sulfur as coolant for nuclear reactor power plants. Such a system may have potential thermal efficiency of 50% — about double that of present nuclear power plants.

### Removal of strontium from milk

Using ion exchange techniques, laboratory studies conducted at the University of Tennessee-Atomic Energy Agricultural Research Laboratory, have shown that it is possible to remove up to 94% of strontium from milk without loss of calcium from the milk.

Fractions of strontium and calcium removed from the milk depend upon kinds and quantities of ion exchange resins used and upon other factors. Calcium-based resins achieved the 94% removal.

Other effects of the treatment on the quality of milk are being studied. Preliminary results indicate that changes, if any, are small.

Radioactive strontium associated with the cream may be removed by repeated dilution with water followed by separation of cream from water.

### Irradiation unit for Shell Chemical

Shell Chemical Corporation has installed a 20,000-curie cobalt-60 irradiation unit at its research center at Torrance, Calif. Gamma rays from it will be used to start and modify chemical reactions in a search for improved rubber, plastics, and radiation resistance products for use in atomic power plants.

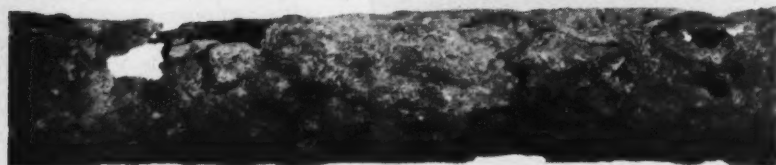
(Hotrodger, Model U, irradiation unit was manufactured by the Nuclear Systems Division of The Budd Company, 2450 Hunting Park Ave., Philadelphia 32, Pa.)

Check 1630 opposite last page.



For exciting drama, watch "Alcoa Presents" every Tuesday, ABC-TV, and the Emmy Award winning "Alcoa Theatre" alternate Mondays, NBC-TV.

**THIS...**  
**PLUS THIS...**  
**STOPS THIS!**



## "SCOTCHRAP" Pipe Protection Tape stops corrosion due to electrolysis and chemical or bacterial attack

"SCOTCHRAP" BRAND Pipe Protection Tape is tough polyvinyl chloride plastic in convenient roll form—quality controlled for uniform electrical properties which include excellent insulation resistance and high electric strength. It offers a quick, low-cost method for protecting pipes, conduits, and other metal surfaces against corrosion. Tight-holding pressure-sensitive adhesive sticks at a touch—no flame, heat, or messy pots needed. *Safe and easy to apply* for spot protection or a whole system—by anyone. "SCOTCHRAP" Tape resists acids, alkalis, and solvents. Available in seven standard widths from 1 inch to 18 inches; in thicknesses of 10 and 20 mils.

Write for free technical literature including application information. Address: 3M Co., 900 Bush Ave., St. Paul 6, Minn., Dept. EAO-119.

"SCOTCHRAP" IS A REGISTERED TRADEMARK OF 3M CO., ST. PAUL 6, MINN.  
 EXPORT: 99 PARK AVE., NEW YORK 16. CANADA: LONDON, ONTARIO



**SCOTCHRAP Pipe Protection Products**

**MINNESOTA MINING AND MANUFACTURING COMPANY**

... WHERE RESEARCH IS THE KEY TO TOMORROW



Check 1631 opposite last page.

**CHEMICAL BUSINESS** / Our Growing Industry

## Dow Hikes Polypropylene Output: Plans New West Coast Facilities

A multi-million-dollar project which will give western United States a local source of polypropylene has been announced by The Dow Chemical Company. Facilities will be built at Torrance, Calif., on a site adjacent to other Dow plastics production units.

The plant is expected to go on stream in 1961. A company spokesman said it will provide "sufficient polypropylene production capacity to supply estimated West Coast requirements."

Facilities to be built at Torrance are in addition to Dow's Bay City, Mich., production which is scheduled for early next year.

Continental Oil Company has under construction a petrochemical plant at Lake Charles, La., for manufacturing from petroleum certain industrial alcohols formerly produced only from natural oils and fats.

The plant, said to be the first of its type in the world, will cost several million dollars. It will have a capacity in excess of 50 million lb annually of higher-molecular-weight straight-chain primary alcohols. The plant is being erected adjacent to Conoco's Lake Charles refinery. Completion is scheduled for early 1961.

California Chemical Company, a subsidiary of Standard Oil Company of California, expects to complete by mid-1960 a 20 million-lb-a-year chemical maleic anhydride plant. The multi-million-dollar facility is being erected at Standard's Richmond, Calif., refinery. Feedstock will be benzene.

Amoco Chemicals Corporation is building a semi-commercial plant near Joliet, Ill., to produce multi-million-lb quantities of trimellitic anhydride. The facilities are expected to be on stream by the middle of next year.

Celanese Corporation of America announces that a multi-million-dollar expansion of its acetic acid plant at Pampa, Texas, has been com-

pleted. Capacity of 240 million lb annually is more than double previous production potential.

Union Carbide Plastics Company, a division of Union Carbide Corporation, is now producing high-pressure polyethylene from a new 80 million-lb-per-year unit at Whiting, Ind.

Emery Industries, Inc. is spending \$6 million to expand its Cincinnati, Ohio, plant to increase substantially existing production of azelaic and pelargonic acids made from oleic acid by ozone oxidation.

Borden Chemical Company was scheduled to begin manufacture of a full line of products last month at its \$500,000 plant at Illiopolis, Ill. Included are industrial coatings and finishes, adhesives, plastisols, hot melts, flooring mastics, underlayments, asphalt emulsions, and other building material products.

Cyanamid of Canada Limited, a subsidiary of American Cyanamid Company, has awarded contracts for construction of a nitric acid producing unit on the site of the company's Welland plant near Niagara Falls, Ontario. An estimated 190 tons daily will be produced. Completion of construction is scheduled for next spring.

Victor Chemical Works is expanding its phosphorus furnace plant at Mount Pleasant, Tenn. Phosphorous from the unit will be converted at other Victor plants into a large number of phosphorous chemicals.

CHEMICAL PROCESSING



National Aniline Division of Allied Chemical Corporation has under construction fumaric acid facilities at Moundsville, W. Va. The plant will double the division's current fumaric acid capacity. Unit is expected to be completed next June.

Monsanto Chemical Company announces work is well under way on a 20-million-lb addition to its maleic anhydride plant at St. Louis. Unit is expected to be on stream next June.

American Potash & Chemical Corporation is boosting capacity of its sodium chlorate plant at Aberdeen, Miss., by 50 percent. The expansion program, costing approximately \$1.25 million, will raise production capacity to 22,500 tons annually from 15,000 tons.

Rogers Corporation has in operation at its Manchester, Conn., plant a new facility for producing a complete line of diallyl phthalate molding compounds.

Foote Mineral Company is increasing by 30 percent the capacity of its electrolytic manganese facilities at the larger of its two Knoxville, Tenn., plants. It is expected the expansion program will be completed by January 1.

Pittsburgh Coke & Chemical Corporation is expanding its activated carbon plant at Neville Island, Pa. The project includes installation of new production equipment and alteration and modification of existing facilities.

Stauffer Chemical Company is building a liquid alum plant at Vernon, Calif. It will have a capacity of 1000 tons a month. Unit is expected to be on stream this year.

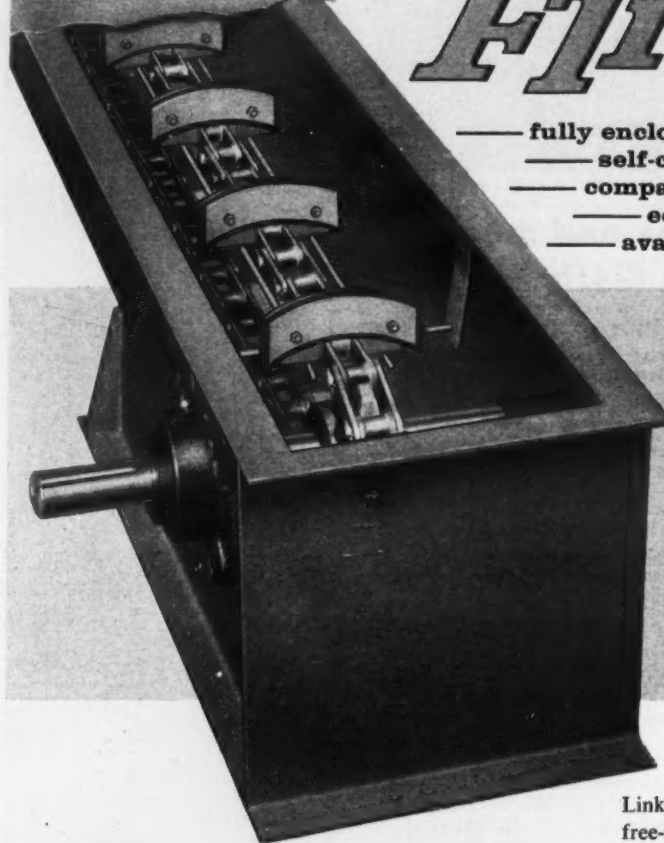
Stauffer has set January as the target date for completion of a thiol (p-chlorothiophenol) plant at Henderson, Nev. When on stream, facilities will raise company's thiol capacity by 50 percent. Existing thiol production facilities at Niagara Falls, N. Y., will be converted to other uses.

The company also announced it has increased ca-

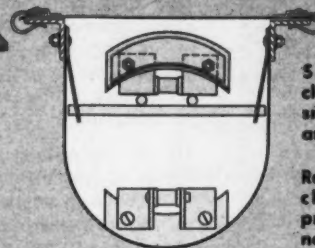
# NOW ... for horizontal or inclined handling of free-flowing bulk materials

## Flite-Flo

- fully enclosed
- self-cleaning
- compact
- economical
- available from stock



Durable, nonmetallic flights hug the trough, wiping it clean.



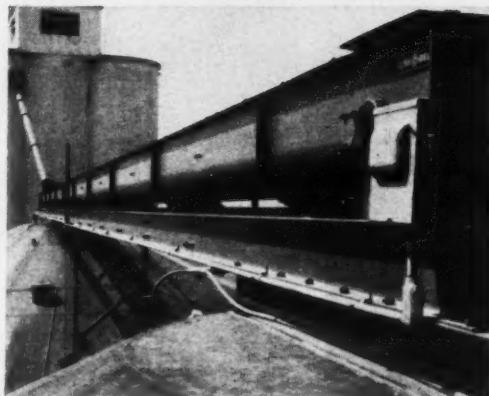
Single-strand chain selected for smooth operation and maximum life.

Return guides for chain maintain proper tracking—no flat surface to hold material—easily removed.

Link-Belt's new Flite-Flo moves granular and other free-flowing materials along inclined as well as horizontal paths with minimum demands on power. And troughs are "swept" clean in the process, eliminating the risk of contamination.

Flexible, nonmetallic flights, braced with steel plates, are shaped to the contour of the U-trough. The effect is a thorough wiping action. The single-strand combination chain operates smoothly in the completely enclosed conveyor. Head and tail shafts ride in Link-Belt sealed, self-aligning ball bearings.

Link-Belt's materials handling specialists are available to help you select and apply this versatile new conveyor. Send for Folder No. 2813.



Flite-Flo conveyor on top of grain storage bins handles materials from one level to another with inclined and horizontal units. Maximum grain handling capacity is 7,000 bu. per hour on 18-in. conveyor with 101-ft. centers.

### LINK-BELT

FLITE-FLO CONVEYORS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

Visit our exhibit, 27th Exposition of Chemical Industries, Coliseum, New York, Nov. 30-Dec. 4, Space No. 163.

Check 1632 opposite last page.



capacity of its Chauncey, N. Y., plant to produce mesyl chloride (methanesulfonyl chloride).

**Air Reduction Pacific Company** expects to have on stream late this year a 30-ton-a-day air separation plant at Richmond, Calif. Facilities are designed to produce liquid oxygen, nitrogen and argon.

**Olin Mathieson Chemical Corporation** is installing Shell's process to make ethylene oxide by the direct oxidation of ethylene at O-M's Doe Run, Ky., plant. October 1960 is the target date for putting the process on stream.

**Du Pont** is installing equipment at its Richmond, Va., cellophane plant for production of polyethylene film for packaging. Production is expected to begin early next year.

**Virginia-Carolina Chemical Corporation** announces a sulfuric acid plant is being built at Nichols, Fla. Its rated daily capacity will be 500 tons, but it will be capable of producing 600 tons. Completion is scheduled for June 1960.

**Clintwood Chemical Company** now is producing surfactants and fine chemicals in a 25,000-sq-ft building it acquired recently in Chicago.

**Hodag Chemical Corporation** has completed construction of its enlarged production, laboratory and office facilities in Chicago. The company handles antifoams, esters, emulsifiers, flocculating agents and other surface-active chemicals.

#### Foreign Plants

**S. p. A. Celene**, a Sicilian company owned jointly by Union Carbide Corporation and Societa Edison, Milan, Italy, is planning to double its polyethylene capacity at a plant now being built at Priolo, near Syracuse, in Sicily. When the original unit begins operations late this year, capacity will be 30 million lb annually, and this will be increased to 60 million lb when the expansion program is

## Who makes and meets your Wire Cloth Specs?

*CAMBRIDGE does . . .*

To assure you of wire cloth fabrications that give long and satisfactory performance, we have experienced engineers who can draw up prints for your approval if necessary, and trained production men who can quickly and accurately fabricate parts to your most rigid specifications.

To fill your most diversified bulk wire cloth needs, we have thousands of items in stock—in all meshes, wire sizes, metals or alloys—ready for prompt delivery.

Modern machinery, careful workmanship and constant inspection assure you of exact mesh count and mesh size. And, our field engineers follow up your order to see that our product is giving the best possible service.

We make wire cloth from any metal or alloy—including titanium—in nine basic weaves—from finest to coarsest mesh. Call your Cambridge Field Engineer for information. He's listed in the yellow pages under "Wire Cloth". Or, write for **FREE 94-PAGE CATALOG.**



**The Cambridge Wire Cloth Co.**

Department F • Cambridge 11, Md.

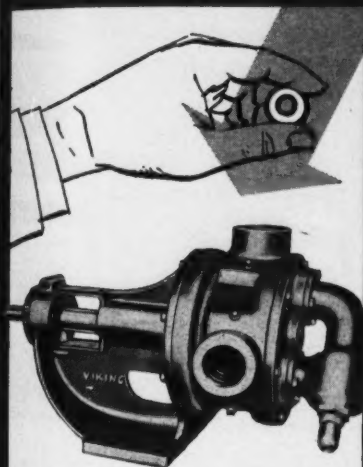
Manufacturers of Wire Cloth,  
Metal-Mesh Conveyor Belts, Wire Cloth Fabrications



Check 1633 opposite last page.

## A New Concept in Pumping \*Abrasive Liquids!

# VIKING PUMPS WITH CERAMIC BEARINGS AND MECHANICAL SEALS



After years of experimenting and testing, Viking has developed this new pump that assures you double to triple life, while pumping paints, inks and other \*abrasive liquids. Among its features are special ceramic bearings and mechanical seals. Designed for heavy duty, these pumps handle liquids from a minimum viscosity of 100 S.S.U. to heaviest viscous types.

G.P.M. SIZES 3 - 6 - 12 - 16 - 25 - 40

When writing for information, please give:

- Liquid to be pumped
- Viscosity of liquid (S.S.U.)
- Percentage and type of solids present in liquid
- Temperature of liquid
- Specific gravity
- Capacity of pump
- Section lift or head
- Discharge pressure

And ask for bulletin SP-507CC

### VIKING PUMP CO.

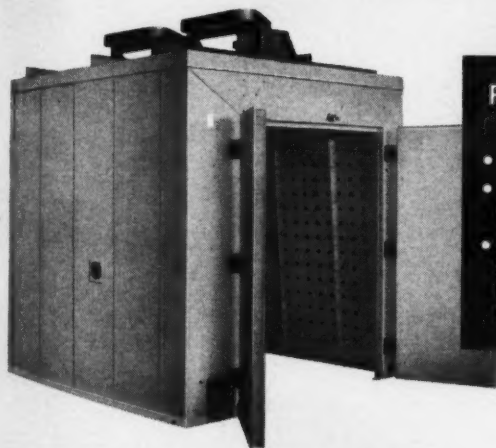
Cedar Falls, Iowa, U.S.A.  
In Canada, it's "ROTO-KING" Pumps

See Our Unit in  
Chemical Engineering Catalog



\*Consult factory for recommendations for pumping abrasive liquids other than paints and inks.

Check 1634 opposite last page.



### PRECISELY CONTROLLED DRYING - CURING

- RECIRCULATION HEATED
- ELECTRIC, GAS, OIL OR STEAM
- ALUMINIZED STEEL OR STAINLESS STEEL, INSULATED PANEL CONSTRUCTION

## Rockwell Ovens

Available in standard types, completely assembled.  
Prompt delivery.

- 1-Bench type—3 sizes
- 2-Cabinet type—3 sizes
- 3-Rack or truck loading type—18 sizes

Rockwell ovens are also made to special requirements for batch or automatic conveyor operation.

Write for  
Bulletins

W. S. Rockwell Company  
2209 Eliot St., Fairfield, Conn.

Check 1635 opposite last page.

completed. The company also plans to produce in the future ethanol, butanol, 2-ethyl-hexanol and ethanolamine.

Ansbacher-Siegle Corporation, a division of Sun Chemical Corporation, has joined with Williams-Hounslow, Ltd., British pigment and dye-stuff manufacturing firm, in the joint ownership and operation of a new company. It will be known as Williams-Ansbacher, Ltd., and will be headquartered in Hounslow, Middlesex, England.

Celulosa Y Derivados, S. A. (Cydsa) of Monterrey, Mexico, and Algemene Kunstzijde Unie, N. V. (A.K.U.) of Arnhem, Holland, have established a joint venture and will erect a factory in Monterrey for production of Nylon 6 and Nylon 66 textile yarns.

Beckacite Resin Ltd. is back in the Reichhold Chemicals, Inc. family and has been converted into a publicly owned company under the name of Reichhold-Beckacite A. G. with headquarters at Vienna, Austria. Existing facilities will be modernized and capacity will be increased to produce basic chemicals, synthetic resins and other products.

Montecatini now has in operation a 30,000-metric-ton-per-year ethylene plant in Ferrara, Italy—the second one in that city. In addition, the plant is designed to produce 15,000 metric tons annually of high-purity propylene product from the pyrolysis of light of heavy naphtha.



BREMER LARKIN

# RELIABILITY IN MECHANICAL SEALING

MEANS



because Dura Seal is backed by 25 years of experience — because Dura Seal is supported by continuous research for meeting modern processing demands — because Dura Seal is engineered to meet your specific operating conditions — because Dura Seal is nationally sold and serviced.

"THE ENGINEERED MECHANICAL SEAL"

For Free Engineering Counsel on Your Sealing Problems, write DURAMETALLIC CORP., Kalamazoo, Michigan

Check 1636 opposite last page.



**Foxboro Pneumatic Consotrol Control Panel at Hercules Powder Company, Burlington, N. J. This Foxboro panel is arranged in a 180° arc so operators can spot warning lights from any position. Continuous air purge in control room eliminates need for explosion-proof electrical switches, alarms, and signal lights.**







**Hercules Powder Company reports:**

**175 Pneumatic Consotrols\*  
on stream three years**

***"—not a single  
unscheduled shutdown"***

At the Hercules plant in Burlington, New Jersey, they're producing millions of pounds of di-methyl terephthalate a year. Foxboro Pneumatic Consotrol indicators, recorders and controllers provide the instrumentation for the entire multi-million dollar plant.

Hercules operators find their Consotrol instruments perfect for the job. They like the  $\pm 1\%$  accuracy of control they get. What's more, they're able to service an M/58 Consotrol Controller — even to a complete disassembly — and have it back in operation in just a few minutes. And they can convert a Consotrol indicator to a recorder by simply inserting a chart drive mechanism.

Get the full story on these low-maintenance, accurate Consotrol Recorder-Controllers before you design your next control system. Write for Bulletin 13-18 — it has all the details. **The Foxboro Company, 8111 Neponset Ave., Foxboro, Mass.**

\*Reg. U.S. Pat. Off.

**FOXBORO**  
REG. U.S. PAT. OFF.

**pneumatic Consotrol instrumentation**

For  
more information  
on product at  
left, specify 1637  
see information  
request blank  
opposite last page.



# Why Hunter Packing Company uses STANOIL Industrial Oil

## Quick facts about STANOIL Industrial Oil

- Antioxidant gives oil resistance to chemical change, minimizes deposits.
- Inhibitor "plates out" on metal surfaces, prevents corrosion.
- Receives special refining to eliminate emulsion problems. Contains additive to minimize foaming.
- High viscosity index. Resists temperature change.

Two reasons: (1) STANOIL is a superior oil. (2) Along with STANOIL, Hunter Packing receives experienced lubrication technical service.

A special antioxidant in STANOIL gives the oil resistance to *chemical* change. Deposits are minimized. The oil has a high viscosity index, is resistant to *temperature* change. It lubricates effectively at both high and low temperatures. Due to special refining techniques, STANOIL will not readily emulsify. A special additive minimizes foaming. STANOIL has a low pour point. It flows freely at low temperatures. A rust inhibitor in STANOIL "plates out" on metal surfaces.

W. P. "Sandy" Wehking, the Standard Oil man who calls on Hunter Packing Company, has plenty of experience in technical service work. He's been at it for 17 years. Sandy studied chemistry at Blackburn College. He has also completed the Standard Oil Sales Engineering School.

To get more information about STANOIL Industrial Oil and to obtain technical help on your lubrication problems, call the Standard Oil office near you in any of the 15 Midwest or Rocky Mountain states. Or write, **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

You expect more from **STANDARD** and you get it!



Temperature check. Frank Perason of Hunter Packing Company and Standard Oil lubrication specialist W. P. "Sandy" Wehking inspect one of four compressors in Hunter plant that uses STANOIL Industrial Oil.

For more information on product at left, specify 1630 see information request blank opposite last page.



*Second Euro-report:*

## Western Europe CPI Firms Boast Broad Product Lines, Strongly Emphasize Plastics

### Editor Vaaler Visits Europe

The world is the beat of CHEMICAL PROCESSING staff members. A case in point is the seven-week tour through Western Europe this summer of Editor John C. Vaaler, shown visiting at Leverkusen, Germany with Dr. H. W. Knauff (left), director of international relations on technical matters for Farbenfabriken Bayer, and Dr. Helmut Albert (right), also of Bayer. His exclusive, up-to-the-minute account of CPI activities in France, West Germany, Switzerland, Italy and The Netherlands is "must" reading. "You are there" when you see through Editor Vaaler's eyes in his second Euro-report the spectacular resurgence of Western Europe's chemical processing industries since World War II.



JOHN C. VAALER, Editor

**W**ESTERN Europe's chemical processing industry is surging ahead on many fronts. France, West Germany, Switzerland, Italy and The Netherlands are showing surprising vitality in growth varying from eight to 18 percent over last year.

This growth pattern constitutes only a part of the vital information we gathered on CPI activity during a tour this summer which covered a number of countries, many of them members of the Common Market.

One of the most interesting things uncovered is the apparent lack of organized commercial chemical development programs such as those established by firms in the United States.

Direction of new product development often is pointed at known uses for given products. Thus, as reported previously, samples of new prod-

ucts are placed with two or three companies instead of being broadcast.

Application research in many cases consists of a liaison between sales and research departments to carry on functions of what we term "commercial chemical development."

#### Market Research

A number of companies visited on the tour did not have an organized plan for market research or specific market research departments. Projects in this category usually are carried on by sales departments in conjunction with technical and chemical research personnel.

There were a few instances noted where market research departments have been organized, and apparently this is establishing a trend which seems destined to grow throughout the Western European chemical processing industry.

Among companies which





## Inside Western Europe's CPI From preceding page

have formed market research groups are D'Ugine, Chemische Werke Huls, Rhone-Poulenc and Farbwerke Hoechst.

Sales operations for the most part are carried on by non-technical personnel. This is not by choice, but by necessity. Many companies would prefer to have technical people, but the shortage of chemists and chemical engineers in Western Europe precludes the possibility of using technical people in straight sales operations.

As more technical personnel become available, these men and women will be trained to aid in presenting a company's sales story. Frequently, we learned, the sales department will call on application research or chemists for help on given problems of presenting technical data to prospects. This direction should, of course, ultimately follow the pattern that has existed in the U. S. for some time.

### Export, Domestic Markets

Exports of some of the companies visited show surprising strength. For example, in Germany, Bayer, Hoechst and Chemische Werke Huls reported exports total 42 percent, 35 percent and 34 percent, respectively.

In Switzerland, CIBA's export business amounts to 95 percent of total production. Lonza, on the other hand, sells its entire output to the domestic market.

Italy's giant Montecatini enterprise channels 33 percent of production to export, and 67 to the home market.

As Western European chemical processing industries continue their resurgence from near postwar prostration, hope is expressed on all sides that exports will keep pace with the overall growth pattern. And it is safe to assume that this hope within the relatively near future should become an actuality.

Here is a rundown on some of the companies visited, coupled with capsule observations on main product lines and unusual phases of operation.

### Pechiney

A broad line of plastics, chlorine products, caustic soda and a number of halogens comprise this French company's line of chemicals.

Some newer products include low-pressure polyethylene, polyester resins, and a complete line of plastic pipe and fittings which parallel those of American manufac-

being made in old plants. But newer products, such as silicones, are being manufactured in very modern operations.

General company policy is to make products which require greater skill rather than those which can be made on a high production basis.

In other words, the philosophy is to produce a high-price commodity in relatively small quantities. Flexibility in

greater part of its production.

Bayer offers 5900 dyestuffs, 2200 chemicals—including plastics and synthetic rubber—1000 pharmaceuticals, 200 types of man-made fibers and more than 275 agricultural chemicals.

Bayer's introduction of the new high-molecular polycarbonate, "Makrolon," came at the same time General Electric announced a similar compound. Peculiarly, both companies were doing research at the same time, and neither knew the other was working on the material.

Mobay's recent announcement of new plant facilities in the States for making this product are the result of a licensing arrangement with Bayer.

It was at this plant that we learned polyurethane usage has grown faster in Europe than in the United States. Undoubtedly, one of the reasons is the fact there was little competition in foam rubber, whereas in the U. S. foam rubber competition had slowed somewhat the introduction of polyurethane as a foaming material.

### Knapsack-Griesheim

The Knapsack plant at Leverkusen is ranked as a basic producer. Its product range includes phosphorous, phosphoric acid, phosphates, fertilizers, organic and inorganic chemicals. It also boasts a large production of acetylene and vinyl chloride.

Although a subsidiary of Fabwerke Hoechst AG., all research, sales and administrative functions are performed at Leverkusen. The plant is located near a source of lignite, and has inexpensive electric power available.

### Badische Anilin-und Soda Fabrik AG.

Ludwigshafen is the home of this company, one of the three largest chemical operations in Western Germany. Product line is broad, and consists essentially of inorganic basic chemicals, organic intermediates, dyestuffs, ni-

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## LAST MONTH

... Reporting on his tour of Western Europe this summer, Editor Vaaler in his first Euro-report (page 28) discussed research ... technology ... Common Market ... joint ventures.

turers. Growth in fluorocarbon products is quite rapid.

Interests in foreign operations include a Foster Wheeler license arrangement with Grace at Memphis for an urea plant; a partnership with Grace at International Metalloids in Puerto Rico, where transistor-grade silicon is being made, and a partnership with Vitro Corporation in Chattanooga which includes rare earth operations.

### Rhone-Poulenc

This French firm is interested in the pharmaceutical and plastics fields. Approximately 50 percent of its activity is centered in pharmaceuticals, with the balance in plastics and heavy organic chemicals. Although it is the largest producer of antibiotics and penicillin in France, the firm also is interested in the synthetic fiber field.

A new venture in the silicone field has been worked out, and the company is in contact with General Electric and Dow Corning. Although consumption per capita of silicones in Western Europe is considerably lower than in the States, nevertheless the company is expanding slowly along this line.

Established products are

batch operations has helped to achieve this.

### D'Ugine

Here's another French producer of a broad line in the organic and inorganic fields. Some of its primary products include hydrofluoric acid and its derivatives, hydrogen peroxide, potassium and ammonium persulfates, sodium chlorite, perchlorites, acetone and its derivatives and calcium carbide.

D'Ugine is the No. 1 French producer of fluorine and its compounds, third ranking producer of chlorine and caustic soda, high ranking in production of sodium, and largest producer of peroxide.

The company has developed its own process for making trichlorofluoromethane, and it has been licensed to Pennsalt in the States for the manufacture of isotrons. D'Ugine is taking a leading role also in producing a variety of fluorine compounds and plastics.

### Bayer

This is one of the three largest chemical companies in Western Germany, and has a line of more than 11,000 products. Intermediates form the

**German Industrialist Says:****Exports Play Key Role in Licensing Patents,  
Know-how of European Chemical Companies**

Executive takes long look at problems encountered by American counterparts in disseminating new technical developments. Decision to license today, he says, is governed by rigid economic appraisal to determine whether over-all benefits will exceed compensation for loss of sales

**DR. H. W. KNAUFF**, Director of  
International Relations on Technical Matters  
Farbenfabriken Bayer Leverkusen, Germany



**DR. HANS WERNER KNAUFF** has been active in the German chemical industry since 1934, when he received a Ph. D. in chemistry. In that year he joined IG Farbenindustrie, and worked as a chemist in the Bayer IG plant in Leverkusen. After World War II ended, he became an assistant to the manager of the process Bayer group. Dr. Knauff also served as liaison officer between Allied occupation authorities and the German management. At the same time he assisted in building up foreign technical relations for the Bayer group.

In 1951, Dr. Knauff was appointed "Prokurist" (officer) of Bayer. From that year until 1953 he was temporary head of the company's patent department. For the last six years, Dr. Knauff has worked exclusively on technical management and foreign technical relations. He has been on the board of directors since 1954.

**I**nternational licensing of chemical technology involves problems both for the licensor and licensee. Differences in political and economic climate, laws, peculiarities of respective markets and mentalities of the indigenous all go to make the business of international licensing a difficult job.

The first problem arising from a possible license arrangement is the question: "Should we grant a license or should we keep our knowledge secret?"

The European chemical industry once was No. 1 in the world. Managers in the past thought it best to defend their dominating position by keeping secret special technical knowledge of their companies and to communicate it only to their foreign subsidiaries, which were mostly wholly owned.

But there have been important changes. Through the repercussions of two world wars, many subsidiaries passed into other hands. Moreover, both the level of technical educa-

tion as well as the appearance of new independent engineering companies have made substantial contributions to the postwar evolution of the chemical industry.

Many techniques have become accessible to everyone, and, as these have lost their proprietary value, management of chemical companies have reoriented their policies.

**Patent Protection Lacking**

Present managers of the European chemical industry realize that new technical developments cannot be monopolized for a long time, particularly when there is no adequate international patent protection possible. Therefore, they have changed their attitude and decided to share new techniques of their companies by licensing certain processes, thereby collecting royalties or other remunerations.

Mutual exchange has stimulated research on both sides of the Atlantic and helped to save considerable time which

could otherwise be spent on new projects. Hence the decision of the management of a European chemical company whether to grant a license or not, or whether to take a license or not, is today more one of time than of principle.

Licensing a foreign company or even a foreign subsidiary means assisting the licensee to compete with the licensor. The decision whether to license or not therefore boils down to an economic appraisal. In other words, will the over-all assets more than compensate for reduction in sales?

This question leads to the most important point arising from possible license agreements. To what extent can international licensing affect our foreign markets? How do we attempt to resolve these problems?

Markets in individual European countries are rather small compared to those of America or Soviet Russia. Therefore, the success of a European chemical company

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## Chem Show Preview:

# Materials and Vie for CPI Spotlight

At the end of this month in New York's Coliseum the curtain will go up on the 1959 version of the Exposition of the Chemical Industries. From November 30 to December 4, approximately 500 exhibitors will ply their wares for the 27th time before an expected crowd of over 40,000.

If it lives up to advance notice, this year's extravaganza will be the biggest yet — in attendance and number of displays. In order to help the Chem Show observer get the most out of his visit, the Editors of **CHEMICAL PROCESSING** have prepared a summary of new developments to be on exhibit.

The information which follows was garnered from manufacturers planning displays at this year's Exposition. They were asked to report on brand new items (or those incorporating important modifications) which are slated for appearance at the Coliseum. Thus, by following this guide, the Chem Show visitor can readily preview the latest in materials and equipment for the chemical processing industries.



### Chemical Materials

Offerings in field of chemical materials will be limited.

**Magnesium silicate, synthetic** — Johns-Manville — is an absorbent for removing free fatty acids, color and odor. It has light color, low loose weight and high absorption.

**Polychlorophenyl dodecanoate** — Chemo Puro Mfg. Corp. — is a mildewcide that does not cause discoloration of textiles and plastics. Sodium p-chloro-m-cresolate is a water-soluble preservative for cutting oils, sodium salicylanilide a textile fungicide for application from aqueous systems.

**Triphenyl phosphite** — Victor Chemical Works — has high stability to heat, air and moisture in stabilizing and plasticizing vinyl polymers. In addition, sodium ammonium pyrophosphate a builder in light duty detergents and intermediates diphenyl-phosphinous chloride, bis(N,N-dimethyl) phosphorodiamidic chloride and N,N-dimethylphosphoramidic dichloride will be introduced. A promising metal ion extractant for aqueous solutions is designated extractant No. 5.

**Powdered activated carbons** — Barnebey-Cheney Co. — in several new grades available for neutral and acid solutions.

**Electrolytic iron** — National-U.S. Radiator Corp. — dendrite granules and chips available for iron derivatives and catalysts. High purity, 99.9%.

### Corrosion Control

Lining of equipment with plastics to give it added corrosion resistance will be featured by several companies.

**Centrifugal pumps** — Goulds Pumps — coated with Penton, along with other process pumps.

**Pipe fittings, valves** — Saran Lined Pipe Co. — are lined with Penton. Saran-lined drainage fittings will handle laboratory corrosives.

**Valves** — Continental Mfg. Co. — that are lined with Penton or glass, with Teflon sleeves, can be used for many chemicals in various applications.

**PVC-lined fittings** — Victaulic Co. of America — have grooved ends.

**PVC-lined pipe** — Swepeco Tube Corporation — and alloy pipe is suitable for severe service.

**Fractionating columns, pipe, hose** — Resistoflex Corporation — are all lined with Teflon.

**Relief Valve** — Chem Flow Corp. — uses Teflon and glass to provide corrosion resistance.

### WE'LL BE THERE

look us up in booth 880

**CHEMICAL PROCESSING** editors will be at the show, of course, and this would be a good chance for a reader-editor "chinfest." Let's exchange ideas . . . maybe we can help each other.

Remember . . . it's booth 880.

**Control valves, ball valves** — Falls Industries — are made of impervious graphite.

**Valves** — Ladish Co. — in new line and clamp-type fittings are corrosion-resistant.

Reinforced plastics play an important role in equipment being shown.

**Centrifugal fan** — Heil Process Equipment Corp. — of huge size is made of glass-reinforced polyester.



# Equipment Suppliers

*... as they gird for the biggest exposition ever*

**Fan** — Industrial Plastic Fabricators — has PVC impeller and steel shaft encased in PVC.

**Storage tank** — Metal Cladding — is made of reinforced plastic.

**Tanks** — du Verre Inc. — as well as fans are fabricated from glass fiber and resin.

New alloys and corrosion-resistant metal equipment will also be on display.

**Super stainless steel** — Union Steel Co.

**Butt-welded tantalum tube** — Haynes Stellite — is designed for use in heat exchangers.

**Aluminum clad with lead** — Knapp Mills — along with stainless clad with lead are other materials available to the corrosion fighter.

## Instrumentation

Individual process-variable indicators, controllers and recorders predominate among instruments making their debut. Instrumentation for computer control will be clearly in evidence.

**Rotameter-transmitter** — Brooks Rotameter Co. — handles tough fluid metering jobs, has straight-through flow, pneumatic or electric transmission.

**Differential pressure transmitter** — Yarnall-Waring Co. — can control a distant indicator, controller or other electrically operated receivers.

**Pour-portioner** — Sterling E. Norcross Companies — meters chemicals direct from drum, is pumpless, motorless.

**Antifoam addition system** — New Brunswick Scientific Co. — uses peristaltic metering pump to automatically add antifoam to fermentation processes.

**Differential pressure converter** — Minneapolis-Honeywell Regulator Co. — converts differential pressure to DC, provides two-wire electric transmission of flow and liquid level variables.

**Pressure and temperature monitors** — Thomas A. Edison Industries, Instrument Div. — offer continuous, reliable, low cost monitoring of these process variables.

**Radiation thermometers** — Radiation Electronics Co. — measure and control temperatures without physical contact. Ranges are 400°F full scale up to 2000°F; other models to 8000°F with response time of two milliseconds, sensitivity of  $\pm 7^\circ\text{F}$ .

**Mass flowmeter** — Hastings-Raydist, Inc. — model SM-1 provides direct reading of mass flow in 0-500 mg/min range. No orifice or by-pass required. A UL approved Class I, Group D gas flowmeter and battery operated vacuum gages will be introduced.

**Density controllers** — Precision Thermometer & Instrument Co. — have high sensitivity, accuracy in controlling density of flowing liquids. Self-indicating, pneumatic model operates on 3- to 15-lb air signal.

**Differential pressure gage** — Wallace & Tiernan Inc. — operates at relatively high line pressures, is accurate to one part in 200 of full scale range. Chemical solution metering pump handles flows from 0.65 to 6030 gph.

**Continuous level indicator** — Robertshaw-Fulton Controls Co. — accurately measure levels of liquids, viscous fluids, powders and granular solids. No moving parts, continuous indication.

**Viscosimeter** — Brinkmann Instruments Inc. — for lab or plant use, covers complete range of viscosities. Valves can be read directly in international centipoise system or recorded.

## Laboratory Apparatus

Equipment for standard laboratory procedure and all phases of research including high pressure work will be found on display.

**High pressure laboratory** — Pressure Products Industries, Inc. — includes all equipment for research work: columns (10 to 50 cc); gages for pressures from 1000 to 100,000 psi; and low-flow, high-pressure control system.



**Absorptiometer** — American LKB, Inc. — aids in chromatographic analysis of compounds sensitive to 254 millimicrons. "Tris" buffer resolves proteins in serum protein analysis to six to nine components. All-glass precision micropump functions against pressures up to 60 psi, delivers four to 60 ml/hr.

**Multiple-reflection galvanometer** — Photovolt Corp. — will share spotlight with new integrator.

**Bench-scale autoclaves** — Autoclave Engineers Sales Corp. — are all stainless steel, complete integral units ready for operation; 300-cc to 1-gal capacity.

**Cone plate viscometer** — Ferranti Electric Inc. — with automatic recorder measures viscosity of Newtonian and non-Newtonian fluids.

**Polarographic analyzer** — Brinkmann Instruments Inc. — offers completely integrated analysis, wide range of voltage and current adjustments. In addition, a potentiograph automatic titrator is applicable to potentiometric, amperometric, coulometric and dead-stop titrations.

**Mercury collector** — Bel-Art Products — will share the spotlight with a polyethylene flask draining rack for lab glass ware.

**Polypropylene pipets** — The Nalge Co., Inc. — mark beginning of a line of calibrated volumetric measuring instruments in polypropylene.

**Thermogravimetric balance** — C. W. Brabender Instruments, Inc. — operates up to 1100°C, is fully recording. High-temperature Plastecorder determines plasticity of coal and ceramics, operates to 600°C.

**Particle size analyzer** — NoVo Div., Industrial Enterprises Inc. — handles wet or dry analysis and is portable.

**Sampling valve** — Strahman Valves, Inc. — permits samples to be withdrawn without undue turbulence or plugging of outlet.

**Evaporator** — Laboratory Glass & Instruments Corp. — provides rapid and simultaneous evaporation under controlled temperature and vacuum of samples from chromatography columns. Also shown will be a fraction collector for effluents.

## Material Handling and Packaging

As usual, a wide variety of interesting and unusual exhibits will line the aisles of the Chem Show to demonstrate latest developments in material handling and packaging to passerby. New products to be shown:

*To next page*



## Chem Show Preview From preceding page

**Check-weighing and sorting balances** — Mettler Instrument Corporation — weigh in approximately ½ sec and are tolerance-adjusted via calibrated weights. Also to be shown — automatic-filling and recording balances and multi-purpose type with accuracy as great as  $\pm 1$  mg.

**Vibration inducers** — Martin Engineering Co. — weigh 81 lb each and will develop over 3000 lb of force. Lightweight model (4½ oz) will also be shown.

### Processing Equipment

One of the outstanding features of the Chem Show will be the wide variety of processing equipment that will be displayed. Latest developments, as well as improved versions of established machinery, are to be exhibited. Here are new units that will be introduced:

**Disperser-dissolver** — The J. H. Day Company — designed to pre-mix, dissolve, and disperse chemicals, paints, inks, and similar materials. New impeller design provides for maximum efficiency. Heavy-duty, double-arm, mixers will also be shown.

**Disperser units** — Herman Hockmeyer & Company — are for rapid dissolving and dispersing of resins and pigments in liquid base. Also to be shown — heavy-duty, horizontal, paste-type and pony mixer units.

**Filters and filter elements** — Commercial Filters Corp. — featuring stainless steel and ceramic construction. Porous ceramic elements have high flow rates, are extremely strong, may be backwashed. Stainless steel filters operate at 450 and 750 psi.

**Separators** — Simon-Carter Company — for processing free-flowing granular materials. Demonstrations will be made with laboratory-sized units.

**Pre-packaged dryer assemblies** — National Drying Machinery Co. — will share display area with conveyor seal for chemical dryers.

**Fractionating distillation column** — M. J. Seavy & Sons — has interchangeable and adjustable plates which permit change of hole size and adjustable plate spacing.

**Fluid bed dryer** — Raymond Division, Combustion Engineering, Inc. — has extended retention time.

**Agitators** — Patterson Foundry and Machine Company — top- and side-entering models provide for easy maintenance. Gear ratios can be quickly changed to give wide range of output speeds. Also to be shown — device that breaks up materials which tend to agglomerate while being dried in conical dryers. Unit extends applications of dryers.

**Air filters** — The Day Company — for dust control or dust recovery systems. Improved units feature simpler and more effective tube cleaning action.

**Reactors** — Star Tank & Filter Corp. — for laboratory and pilot plant use. Package unit has 10 gal capacity, is made of stainless steel, comes equipped with column, condenser, and other accessories.

**Pulverizers** — The Strong-Scott Mfg. Co. — for grinding hard or soft materials in extreme fine range. Easy to clean and maintain. Company will also display jacketed mixer and sanitary-design ribbon blender.

**Homogenizer** — Buschman Products, Inc. — incorporates three stages of homogenization. Capacities range from 150 to 500 gph. Four models will be displayed.

**Mixers** — The T. L. Smith Co. — feature turbine-type design. Improve many mixing operations. Speed and efficiency are outstanding features.

**Pressure leaf filters** — Hercules Filter Corp. — small industrial unit is fitted with "H" channel leaves. Other units to be shown have rotating jet header and are self-cleaning.

**Dewatering press** — Edward Renneburg & Sons, Co. — features multi-stage design, has high efficiency and capacity. Firm will also exhibit rotary dryers.

**Cryogenerators** — North American Philips Company, Inc. — are designed for operation in range of  $-330^{\circ}\text{F}$  to ambient temperature. Capacities are from 3000 to 170,000 Btu per hr. Liquid nitrogen generator will also be exhibited. Compact unit produces six liters of pure nitrogen per hr over an uninterrupted period of 200 hrs.

**Continuous mixers** — Industrial Products Engineering Co. — feature simple construction and designed for continuous operation. Dispersion unit will also be displayed.

**Pressure filter** — United States Filter Co. — machine features automatic cleaning. Full production model will be on exhibit.

**Mixers, dispersers, roll mills** — Charles Ross & Son Company, Inc. — incorporate many new features. High speed three-roll mills have one-point hydraulic control for ease in setting. Improved crushers will also be shown.

**Horizontal filter** — Process Filters Division, Bowser, Inc. — horizontal leaf design simplifies operation and reduces operating costs.

**Evaporator-stripper** — Artisan Metal — can recover small fractions accurately from large streams. Products being handled may be heat sensitive or highly viscous.

**Continuous culture apparatus** — New Brunswick Science Co. — permits continuous propagation of bacteria in submerged cultures.

**Mixer** — S. Blickman, Inc. — is suitable for homogenizing, dispersing, and blending. All stainless steel unit can be disassembled in 15 min.

**Extruder** — C. G. Sargent's Sons Corp. — efficiently preforms chemical, rubber and food products. Unit requires minimum maintenance and can be used as feeding device for dryers. Granulator and a single conveyor dryer will also be shown.

**Filter** — Niagara Filters Division, American Machine and Metals, Inc. — has pressure-leaf design, can be operated entirely automatically.

*To page 171*

### HOURS:

**Opens Monday, November 30, at Noon; 10 A.M. every day, Tuesday, December 1, through Friday, December 4.**

**Closes 6 P.M. on Tuesday, Wednesday and Friday; 10 P.M. on Monday and Thursday.**

**Gas diffuser** — Yeomans Brothers Company — for various chemical applications. Operates in both closed and open systems with high efficiency. Industrial waste handling equipment will also be exhibited.

**Vertical pulverizer** — Pulverizing Machinery Division, Metals Disintegrating Company, Inc. — has built-in air-classifier. Air flow through machine is deflected to boost capacity, efficiency. Size of grind can be regulated while mill is operating.

At Universal Clay Products Company, various clays and liquids must be blended to produce formulations used in manufacture of industrial ceramics. In a recent departure from conventional methods, company found that . . .

## Blender slashes mixing time 20%, lowers equipment costs 50%

**S**avings in time and equipment costs, and a more uniform product are being obtained at Universal Clay Products Co., Sandusky, Ohio, with a 20-cubic-foot, Liquid-Solids® blender. Blender is loaded, pre-blends, disperses water, post-blends, and discharges 900 lb of clay body preparation in just under 14 minutes, a reduction of 20% in mixing time compared to previously used method.

By combining several blending operations in one unit, company has eliminated from its previous blending process a pulverizer, and a three-belt conveyor system built around conventional muller-type mixing equipment. According to company vice president, Richard B. Fuller, cost of installing blender is "approximately 50 to 55% lower than cost of standard set-up."

In normal operations, UCP produces 10 to 12 different clay bodies in manufacture of industrial ceramics. These range from wet and dry processed clays to a lithium aluminum silicate used primarily for high-thermal-shock-resistant applications. Moisture content, an extremely important factor in preparing ceramic granules, can be accurately controlled with blender to whatever degree is required. This can vary from a fine mist or spray to a gallons-per-minute flow.

At present, clay body being handled by blender is a standard electrical porcelain body which accounts for about 10% of company's total production. It is a feld-spar-clay-flint

composition being subjected to spherical granulation.

Moisture content and control — dependent on nature of the clay as well as the liquid and its speed of dispersion to solids — were worked out between UCP engineers and chemists in supplier's pre-test laboratory. Various batches submitted for testing were formulated and examined until correct blending procedures were obtained.

### Installation Detail

Complete blending installation at Universal Clay includes blender, a winch-hoisted, 900-lb-capacity hopper which lowers into a well for floor-level loading, and a discharge shield for running discharge.

Blender consists of two cylinders cut and joined at right angles to form a twin-shell or V-shaped design. Water or other liquid is fed to composition being blended through a rapidly revolving feed bar assembly, connected across blender axis.

This assembly is a hollow stainless steel bar on which are mounted four liquid distributor discs with minute openings to provide proper amount of liquid dispersion. Mounted on outside edges of each dispersion disc are eight dispersion blades resembling L-shaped hooks, approximately one-inch high. When bar is revolving at high speeds during blending operations, these dispersion blades supply necessary agitation required to produce spherical granules

best suited to pressing and firing. Any liquid which flows, or can be pumped, can be introduced by feed bar assembly.

### Operating Procedure

Ingredients are charged to blender through an opening at top of one of twin-shell cylinders (either can be used) and discharged through 12-inch pivot slide valve at bottom, or apex, of blender. If blended material does not flow easily a running discharge is made.

In charging the blender, various body ingredients are weighed and dumped into loading hopper. Hopper is hoisted above blender opening, canvas dust protectors are adjusted and hopper load discharged to blender. Normal batch size for each blend is 900 lb. Time: three minutes.

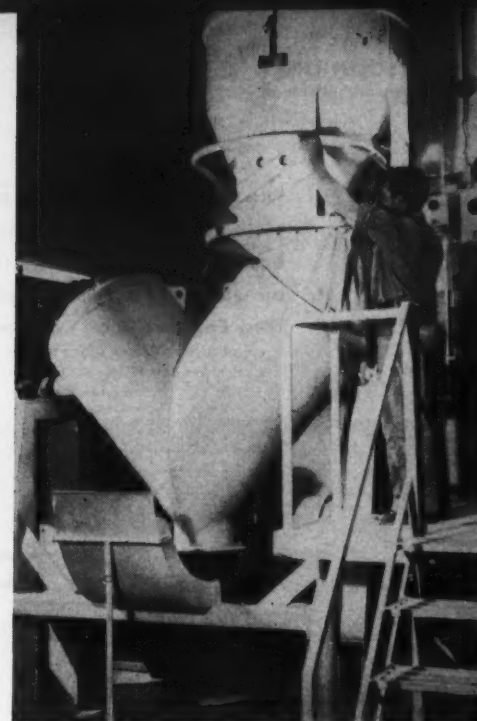
Blender is rotated at 20 rpm and liquid-feed bar is started to pre-blend body materials before adding water. Time: two minutes.

Water is added to pre-mix at rate of four gallons/minute for a total of 19¾ gallons. Flow is controlled only to avoid over-loading liquid-feed bar and flooding batch. Time: four minutes, 55 seconds.

Blender is rotated for a post-mix to complete liquid dispersion and assure proper saturation of body granules. Time: one minute.

Blender is stopped, discharge door removed, and shell rotated to accomplish a running discharge into a clay box. Time: two minutes.

To clean blender when body



Operator at Universal Clay Products Co., Sandusky, Ohio, charging blender. Complete blending cycle for 900-lb batch takes just under 14 minutes



Liquid feed bar assembly is connected across blender axis. Intensifier dispersion blades on dispersion discs supply necessary agitation

formulations are changed, operator closes discharge valve, which is equipped with a ¾" drain tap, attaches a drain hose connection which leads to plant's main sewer line, and hoses down feed bar and inside of blender. This is only cleaning required and is completed in approximately four to five minutes.

(Liquid-Solids blender is a product of Patterson-Kelley Co., Inc., E. Stroudsburg, Pa.)

Check 1639 opposite last page.



The manufacture of lime and its applications goes back to the dawn of civilization. Citing another example of how modern technology can streamline processes to keep up with the increasing demand for old reliable products, New England Lime Company uses . . .

## Solids fluidization — for limestone calcination

TED F. MEINHOLD, Associate Editor  
with F. S. WHITE, Vice President  
New England Lime Company

Use of solids fluidization teamed up with an efficient product cooling and conveying device has boosted lime production, cut costs, and resulted in the manufacture of an even-better quality product at the New England Lime Company. The recently installed equipment at the firm's North Adams, Massachusetts plant has the capacity of turn-

ing out 120 tons per day of high-calcium quick-lime. Calcium oxide content is 95.5% — which is 3 to 4% higher than that formerly obtained with conventional calcining kilns.

Fuel consumption has also been slashed. Because of high thermal efficiencies obtained with solids fluidization, almost twice as much product is

processed per gallon of fuel oil than before.

A pioneer in the application of fluidized solids to calcination of limestone, the plant now has two such systems operating. The first big commercial size unit was installed in 1949. Its capacity is 100 tpd. The company had a 10 tpd experimental system on stream as far back as 1945.

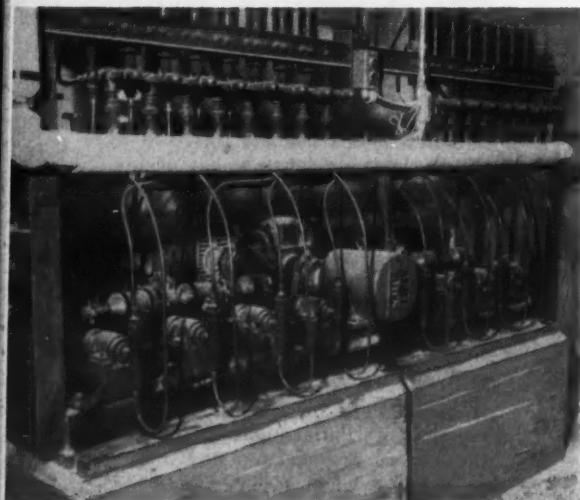
Although total plant capacity has been increased from 160 to 420 tpd, the amount of space occupied by processing equipment has been reduced by as much as 25%. This has been mostly due to the scrapping of older 6'-diam x 100'-long conventional kilns. A total of two such kilns have been removed since the 1949 FluoSolids system was installed.

In addition to the high-calcium chemical grade lime, the company produces hydrated lime, precipitated chalks, and industrial limestone fillers. These are marketed under the tradename NELCO.

### Process

Raw material coming into the plant is a high-calcium crystalline limestone containing between 95 and 97% calcium carbonate. The stone is crushed and ground to pass a -5 mesh screen. After grinding, the material is sent to a large single-bed, 9' ID x 22½' high, fluidized reactor for drying and de-dusting.

Output of this unit ranges



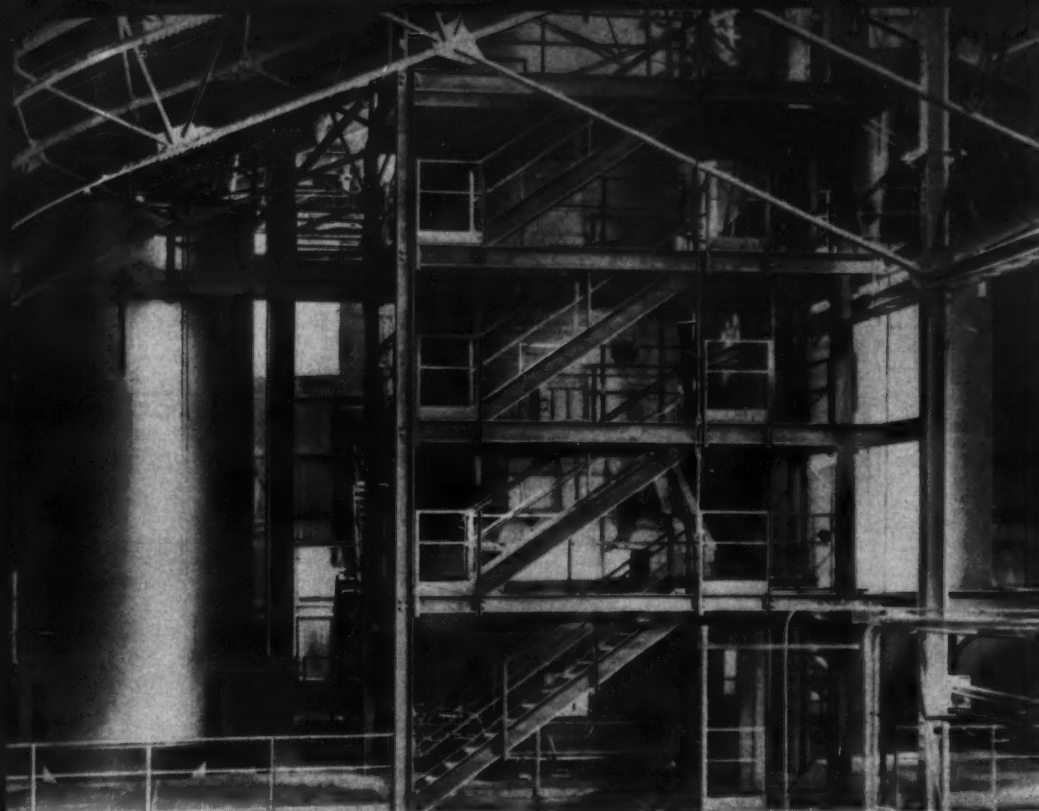
Calcination takes place at 1850°F. Reactor's "nerve center" is this control panel

CP Staff Photo

Hills-McCanna positive displacement pumps driven from a common shaft provide accurate amounts of fuel oil to each of the reactor's 16 burners

CP Staff Photo





between 100 and 125 tph — which is enough to adequately supply both of the plant's calcination systems. Limestone going into dryer contains up to 3% moisture. Dried product has less than 0.1%.

Air for fluidization is furnished to dryer at rate of 12,000 cfm. Bed temperature is 200-225°F. Fuel consumption amounts to 50-60 gal Bunker C oil per 100 tons limestone.

#### Fluidized Calcination

The recently installed 120 tpd fluidized calcination unit is the culmination of the years of valuable know-how and experience gained with the initial equipment. The reactor is a multi-stage unit 17½' in diam and 49' high. The vertical steel shell is lined with 9" of firebrick. Four firebrick constriction domes divide the reactor into five stages, the top three being used for preheating, the fourth for calcination, and the fifth for cooling.

Calcination of limestone to quicklime requires the transfer of large quantity of heat

at high and closely controlled temperature. The fluidized reactor does this effectively and efficiently. Operating continuously and automatically, calcination takes place at about 1850°F. Temperatures are controlled within  $\pm 20^\circ\text{F}$ . Feed enters reactor at top, being regulated at a rate to properly stabilize the processing temperature.

Fluidization air flows up through unit from the bottom. Heat is supplied by means of 16 burners mounted radially around the reactor's calcining stage. A positive displacement pump driven from a common shaft by variable-speed, 2-hp motor, provides each burner with fuel oil. Plant uses Bunker C having heat value of about 152,000 Btu per gal.

On the fluidized solids reactor, no effort is made to atomize oil with air or to preheat it beyond pumping consistency. Fuel consumption is approximately 3600 gpd, or about 30 gal per ton of lime.

Air flow through reactor is adjusted to hold 3 to 5% excess air as determined by a Hays recording oxygen instrument analyzing the stack

gases. Normal air flow is approximately 3700 cfm, being furnished by 18" blower powered by 150-hp motor.

#### Dual-purpose Conveyors

Also playing a big role in the plant are the triple-purpose conveyors that the product drops into after leaving the fluidized reactor. Of an efficient screw-type design, units cool and mix the lime while it is moving to the storage bins.

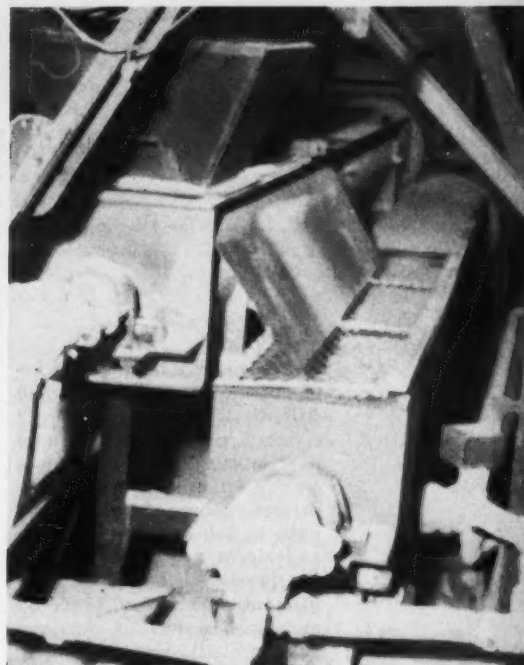
There are two of these conveyors in the system. Operated in series, each measures 15' long and about 12½" wide. Units handle approximately 4.8 tph, cooling the lime from 715° to 225°F.

A 3-hp motor drives both conveyors at 13 rpm. Well water, at 52°F, is used for cooling. This circulates through conveyor's jacketed trough and hollow screws. Overall heat transfer coefficient is 15.5 Btu/hr/sq ft/°F.

The calcined lime, which weighs 72.5 lb per cu ft, is handled very gently. There is no deterioration of the product and particle size is not

Solids fluidization system turns out 120 tons calcined lime per day. Unit has boosted production, cut costs, and further improved the product

Dual-purpose conveyor cools, mixes, and moves lime to storage bin conveyor



CP Staff Photo

damaged in any way. Retention time is about one minute. The conveyors have given efficient, satisfactory service, and have required only minimum routine maintenance.

(Dorrco FluoSolids systems are manufactured by Dorr-Oliver Incorporated, Stamford, Connecticut.)

Check 1640 opposite last page.

(Rietz Thermascrew conveyors are product of Rietz Manufacturing Company, 150 Todd Road, Santa Rosa, California.)

Check 1641 opposite last page.

(Further information about NELCO high-calcium chemical lime may be obtained from the New England Lime Company, Adams, Mass.)

Check 1642 opposite last page.

To meet low-oil-content specs on paraffin wax and still supply growing product demand, The Atlantic Refining Co. modernized and expanded their Philadelphia facilities. In up-to-date, multi-million-dollar installation . . .

## Rotary-drum Filters Form Heart of

THEODORE W. WETT, Associate Editor  
with J. B. CLAPHAM,  
Lubricating Sect. Departmental Asst.  
The Atlantic Refining Company, Philadelphia, Pa.

**P**roblem: Existing wax manufacturing facilities at The Atlantic Refining Company's refinery in Philadelphia, could not satisfy growing product demand. Plate and frame presses, most of which had been in use for over 50 years, and sweat ovens which were nearly as old, had been supplemented in recent years by an emulsion deoiling unit and vacuum still. Even operating at full capacity this installation was not sufficient.

In addition, sweat ovens used for final deoiling of refined wax could not keep up with trend toward lower-oil-content products without a further sacrifice in capacity.

**Solution:** Atlantic's management decided that a major modernization and expansion was in order. Facilities for production of over 250 tons per day of close-cut, high-quality, low-oil-content paraffin waxes were designed and constructed.

Basically, installation uses Texaco Development Corporation's methyl ethyl ketone solvent dewaxing process. Heart of this process is filter section where wax and oil are separated. Three filtering stages are dewaxing, repulping, and wax fractionation.

Selected wax distillates are pumped from storage to battery of 16 double-pipe scraped-surface exchangers and 17 double-pipe scraped-surface chillers which chill wax mixes for all three filter stages. Each unit consists of twelve 6" horizontal pipes about 50' long jacketed by 8" outer pipes. Flow through inner pipes in all cases is wax mix on its way to filters. Each chiller is operated with a flooded recirculation refrigerant system. All are inclined slightly from the horizontal to promote rapid recirculation and gas elimination.

In exchangers, primary wax mix is exchanged against primary filtrate, wax mix fed to wax fractionation is exchanged against its filtrate. Combination of chillers and exchangers required for each filter stage is determined by operating conditions necessary to handle various feed stocks for product desired.

First two filtering stages are normally operated at temperatures of the order of 10 to 20°F, with repulping stage operating at 10° above dewaxing stage. Dewaxed oil product of

first stage is stripped of its solvent content and provides paraffin oils. Repulp wax mix, containing a fairly low-oil-content slack wax, is reheated to solution without stripping, and chilled to temperatures of the order of 60°F for charge to wax fractionation filters.

In this stage, higher-melting-point hard waxes are recovered as filter cake. Lower-melting-point waxes, together with practically all of oil from repulp wax mix, appear in filtrate. Stripped cake, after acid treating and clay percolation, is fully refined wax product. Filtrate is sweated to crude scale wax and may be acid treated and clay percolated to a semi-refined wax.

Filtering cycle is performed by 14 rotary vacuum filters with variable speed drives to permit drum speeds ranging from 0.75 to 9 minutes/revolution. Each unit has an 11'-diameter 20'-long filter drum in a vapor-tight, horizontally split housing, and provides an effective filtering area of 700 sq ft.

Surface of each drum is subdivided into 30 longitudinal compartments separated by division strips. Working surface of each compartment consists of a die formed screen shaped to radius of drum deck, covered by a fine mesh screen which serves as backing for canvas filter cloth. Cloth is securely held in place by brass locking strips fitted into continuous slots along longitudinal division strips.

Each segmental compartment is provided with drains manifolded into common drain



Atlantic's multi-million-dollar paraffin wax plant produces 265 tons of wax/day. On left are scraper-chillers; on right — filter house; center — control room

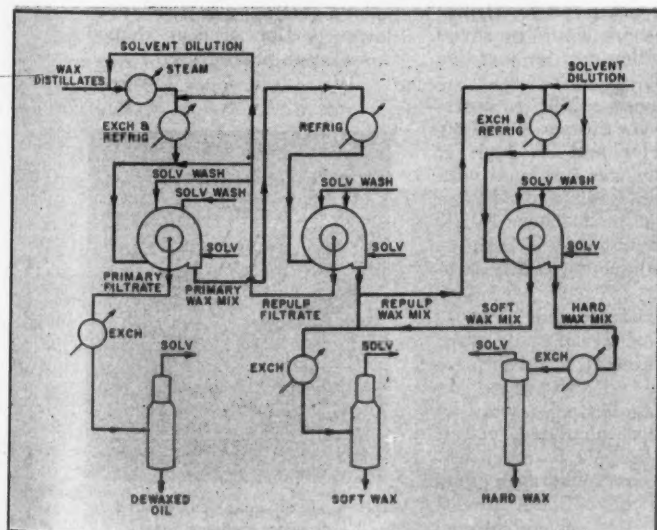


# High-quality Wax Plant



Five of fourteen rotary drum filters that form the heart of wax manufacturing process. Each unit has 700 sq ft of filtering area

▼ Simplified flow diagram of paraffin wax plant



headers and run to a special rotary valve. Depending on its position in cycle, each compartment is selectively subjected to either vacuum or flue-gas pressure. All filters are blanketed with flue gas.

## Filter Operation

Rotary drum is designed to operate at approximately 50% submergence in wax mix solution. Chilled wax mix from elevated filter-feed tanks flows by gravity into filter vats under liquid level control. As drum rotates in mix, dewaxed oil and solvent are pulled by vacuum through filter cloth and drained into filtrate receivers. Simultaneously, wax cake is progressively built up on canvas covering. As wax cake emerges from mix it is washed by solvent sprays and dried by flue-gas under vacuum.

At end of this cycle, undercake compartment is subjected to slight flue-gas pressure and dry cake is blown free and deflected by a scraper blade into a scroll-type discharge conveyor.

Filtrate is continuously pumped from filtrate receivers, through exchangers, and into flue-gas blanketed surge tanks for charge to solvent recovery or as dilution and

wash solvent. Solvent is separated from soft wax, hard wax, and dewaxed oil and returned to storage for re-use. A separate recovery system is provided for each product.

Plant has a charge-stock capacity of 8000 to 15,000 barrels/day and is designed for easy expansion. Filter house is large enough to accommodate an additional filter. Refrigeration capacity is 20% greater than design requirements. Investment cost of on-site facilities was approximately \$10 million. Construction time was slightly under 14 months.

**Results:** Installation has a rated capacity in excess of 216 million pounds/year of finest quality paraffin waxes of low oil content, some as low as 0.2%. It is capable of handling eight different feedstocks through 14 operations to produce a full line of refined and semi-refined waxes.

(Wax plant was designed and constructed by Badger Manufacturing Co., Cambridge, Massachusetts.)

Check 1643 opposite last page.

(Filters are a product of Goslin-Birmingham Manufacturing Co., Inc., Birmingham, Alabama.)

Check 1644 opposite last page.

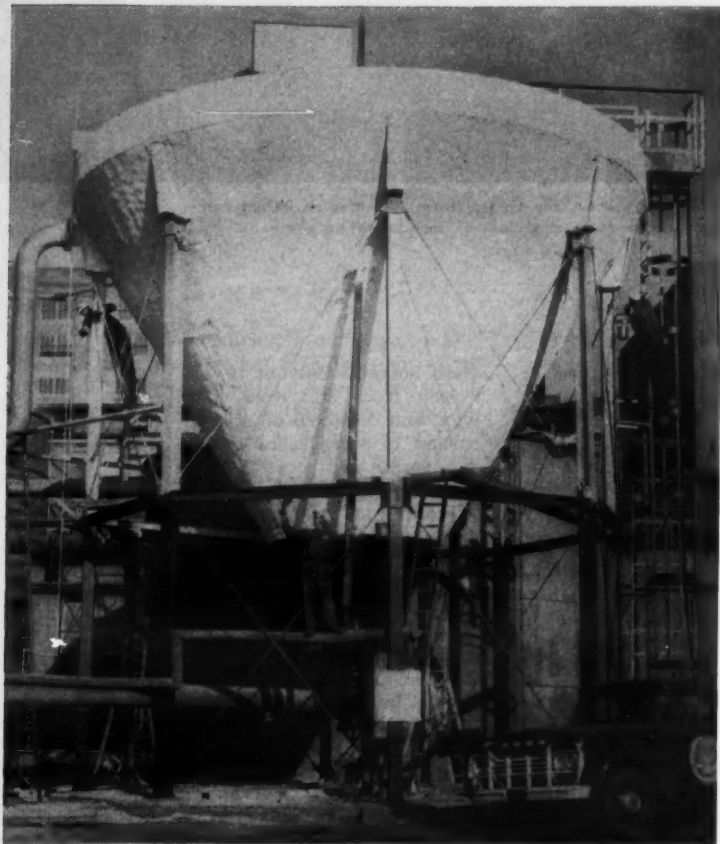


Wax plant's nerve center, the control room, provides an instant and accurate check on conditions of each operating phase

Development of commercial procedure and mobile, easily handled equipment for spraying fluorocarbon-filled rigid polyether urethane foam, while providing a material with unusually low  $k$  factor that protects vessels from corrosion, also has major economic advantage as it —

## Saves up to 75% in Application Cost for Insulating Tanks

**GORDON WEYERMULLER**  
Associate Editor



Cone-shaped brine tank which was sprayed with a 2" thickness of fluorocarbon-filled urethane foam to prevent excessive condensation and resultant corrosion of steel surface



Member of regular paint crew spraying urethane foam on Wyandotte tank

**M**ost outstanding benefit that is obtained through the development of a successful commercial method for spraying fluorocarbon-filled polyether urethane foam is in reduced cost of application. This has been shown by experience at Wyandotte Chemicals Corporation, Wyandotte, Michigan, where the system has been in regular use for several months.

For example, maintenance superintendent at the plant estimates that the application cost for insulating a 24' high by 30' wide caustic storage tank would be about \$4000, using conventional methods. Application cost for spraying the same tank with fluorocarbon-filled foam is estimated at about \$1000. Hence, \$3000 or more would be saved in application cost for just this one tank.

In August 1959, a cone-shaped brine storage vessel 30' in diameter and 35' high at Wyandotte was insulated with a 2" thickness of the urethane foam in 25 or 30 hours of actual spraying time. Vessel is one on which it is difficult to work.

It is estimated that it would have taken considerably more time to install conventional insulation on this vessel. In general, application savings up to 75% are calculated; viz., it requires only  $\frac{1}{4}$  as much application cost by spray method as with conventional procedure. Surfaces can be sprayed

at rate of 10-20 board feet per minute.

### Corrosion Control

This cone-shaped brine re-saturation tank, which contains brine at 58°F, had been subject to excessive sweating, with resultant corrosion of steel. Application of the urethane foam on it has eliminated the condensation and is protecting the vessel.

Urethane foam has very good resistance to caustic and to certain acids. Increased information on chemical resistance will come with greater field experience. A corrosion-resistant protective coating can be applied over foam. For example, Tarsol coal tar-epoxy coating was used over lower portion of cone-shaped vessel. See photograph.

To page 41



This is all of equipment needed for spraying urethane foam

Use of mercury-arc rectifiers reaps multiple benefits  
at Oxford Paper Company's electrolytic chlorine plant.  
Providing reliable service at minimum cost, units . . .

- **Boost AC-DC Conversion Efficiency**
- **Assure Safe Chlorine Cell Operation**

**TED F. MEINHOLD**, Associate Editor  
with **WILLARD STONE**, Superintendent  
Electrochemical Department, Oxford Paper Company

**Problem:** Motor-generator units used for providing 200-220 v DC power to electrolytic chlorine cells required excessive maintenance and repair at Oxford Paper Company, Rumford, Maine. The six units, having been in service a considerable number of years, were rapidly losing their efficiency, and becoming quite costly to operate.

Another big disadvantage was the almost-constant observation that they needed. Since the chlorine cells act very much like inefficient storage batteries, any sudden failure of AC (driving the motors) could cause backcurrent from the cells to operate the DC rotary generators. If AC is restored while generators are in reverse, the synchronous motors will continue their reverse action and cause DC to flow in reverse to the cells.

This could explode the mixture of hydrogen and chlorine in the cells and result in serious damage.

The plant's electrochemical department has a total of 288 Sorensen horizontal-type chlorine cells. Units produce about 14-15 tons chlorine per day. The gas is used to bleach pulp going into the company's

line of high-grade paper.

**Solution:** The motor-generator units were replaced by six 450-kw sealed-tube, mercury-arc rectifiers. The self-cooled units are arranged in a continuous line-up with each rectifier serving 48 chlorine cells. Rectifiers have 1800 amp rating at 250 v DC. Incoming AC supply is three-phase, 60 cycle, 11,000 v.

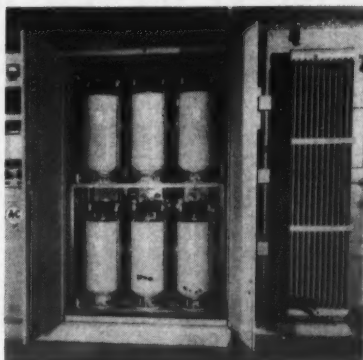
Each unit consists of a self-cooled, insulated transformer, a rectifier tube chamber with six sealed 400 amp tubes, and a two-pole DC cathode breaker-control compartment. Three of the rectifiers have transformer windings connected in delta. The other three are connected in wye. In effect, this creates a 12-phase load on the AC system which results in a high power factor (approximately 95% lagging). It also minimizes telephone interference.

*To next page*

Six sealed-tube, mercury-arc rectifiers are arranged in a continuous line-up. Each unit serves 48 chlorine cells



The plant's electrochemical department has a total of 288 Sorensen chlorine cells producing about 14-15 tons chlorine gas per day



Rectifier tube compartment showing the arrangement of the six sealed tubes on one of the units



## NEW SOLUTIONS

From preceding page

A magnetic-amplifier type regulator keeps current of each unit constant. Amperage is automatically maintained at 1700 with voltage being adjusted accordingly between 200 and 220 v.

### Pilot Arc

Rectifiers also have continuous excitation arrangement. A pilot arc is always present. This eliminates need for continuous and synchronized re-ignition. Rectifiers will continue operating even through severe AC voltage disturbances.

Pen chart on each unit continuously records cell line current and also helps spot any abnormalities in cell room operations. Sensitive electronic relays detect any malfunctions occurring in rectifiers and indicate them on annunciator panels. If necessary, the relays will trip cell line breakers. Signal horn will also sound in cell room.

**Results:** The sealed-tube, mercury-arc rectifiers provide DC power to the chlorine cells smoothly and economically. The units are safe, dependable, and require little, if any, attention. Only one man per shift is now needed to operate the cell room — compared to two formerly required. This has released three men (one from each shift) for duty elsewhere in the plant.

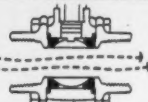

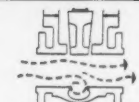
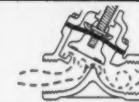
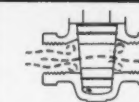
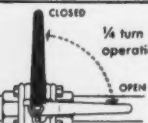

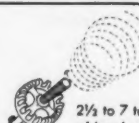
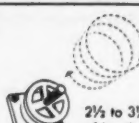
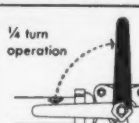

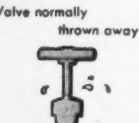
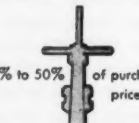
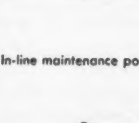
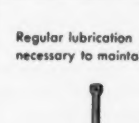


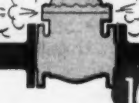

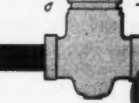
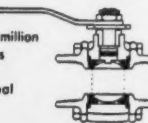
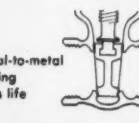
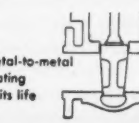
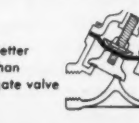
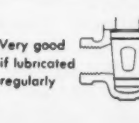
Efficiency of the rectifiers is about 10 percent higher than for the old motor-generator units. No major difficulties have been experienced since rectifiers were installed a few years ago, although a few of the tubes have had to be replaced. Also, the cooling water system on one unit developed a leak.

Signals and annunciators are checked every six months to assure proper functioning. Daily maintenance on rectifiers consists of reading meters, checking temperatures, and changing charts.

(Rectifiers were manufactured by Allis-Chalmers Manufacturing Company, Box 512, Milwaukee 1, Wisconsin.)

Check 1645 opposite last page.

# COMPARE...

ECON-O-MISER	GATE VALVE	FLANGED GATE VALVE	DIAPHRAGM VALVE	LUBRICATED PLUG VALVE
 Smooth round flow	 Turbulence results in excessive pressure drop	 Turbulence results in excessive pressure drop	 Turbulence results in unusually high pressure drop	 Constricted flow... pressure drop
 CLOSED 1/4 turn operation OPEN	 2 1/4 to 3 1/2 turns of hand wheel	 2 1/2 to 7 turns of hand wheel	 2 1/4 to 3 1/2 turns of hand wheel	 1/4 turn operation
 Seats and "O" Rings easily replaced	 Valve normally thrown away	 30% to 50% of purchase price	 In-line maintenance possible	 Regular lubrication necessary to maintain seal
 CENTER TO TOP—OPEN 3 1/4	 12 1/2	 16 1/2	 7 1/2	 10 1/2
 Half million cycles not unusual	 Metal-to-metal seating limits life	 Metal-to-metal seating limits life	 Better than gate valve	 Very good if lubricated regularly

THE ECON-O-MISER BALL VALVE  
IS THE IDEAL REPLACEMENT FOR MOST  
ON-OFF VALVES NOW IN USE IN THE  
PROCESS INDUSTRIES!

MORE EFFICIENT... LESS COSTLY

# THE ECON-O-MISER BALL VALVE

NEW SOLUTIONS

## Insulating Tanks

From page 38

Another major advantage of this urethane foam system is the low insulation factor achieved by filling the cells of the foam with tri-chloro-fluoro methane (Freon 11, Genetron-11, Isotron-11 or Ucon-11). K value for the fluorocarbon-filled foam is 0.14 Btu/sq ft/hr/°F/inch for a 2 to 3 lb/cu ft foam. This can be compared to 0.25 k factor for conventional insulation. Hence, foamed material need only be about half as thick as conventional insulation to provide an equivalent heat barrier.

## Other Advantages

One of the chief advantages of the system is that the foam can be sprayed with light-

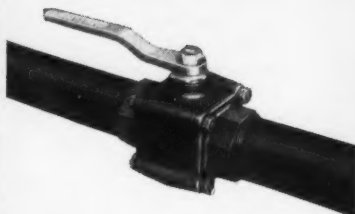
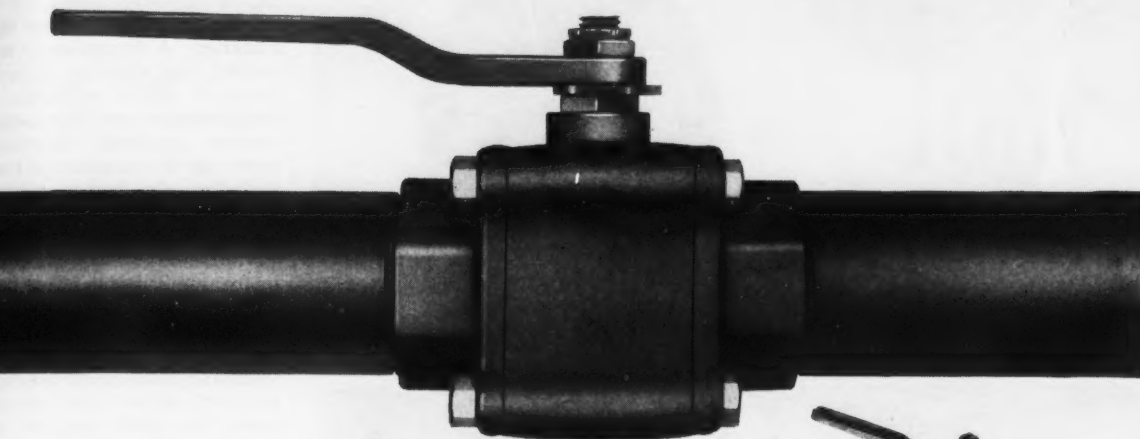


Special spray gun developed for fluorocarbon-filled urethane foam system

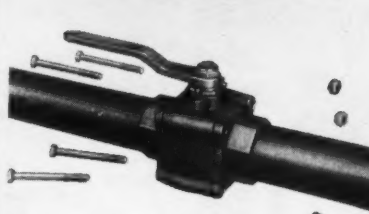
weight mobile equipment by regular maintenance crew. At Wyandotte, the regular plant paint crew spray the foam as easily as paint. Little special training is required. Care must be taken in the initial set up of equipment at start of spraying operation. A conventional hood-type respirator is worn while spraying.

Foam has excellent adherence to regular or irregular steel surfaces. In most cases, no surface preparation is needed. Sprayed components reach surface as a liquid and begin to expand immediately. Foam rises and sets tack-free in less than five minutes.

Toughest problem in developing the commercial system



Compact, efficient ECON-O-MISER Ball Valves are today's smoothest operating on-off valves. A quarter turn of the handle allows full operation and you can tell at a glance whether the valve is open or closed. More... ECON-O-MISER Ball Valves act as both valve and union... eliminate costly inventory and labor. Minimum turbulence and greater economy make this valve ideal for hundreds of applications.



Remove four nuts... four bolts... and the entire center section lifts out for servicing. Quick, convenient maintenance saves money and this unique design means pipe ends never have to be removed from the line. Seating surfaces and O-Rings are easily replaced... whole valve back in operation in minutes. Reduces inventory expenses and frees maintenance personnel from time consuming repairs.



The ECON-O-MISER Ball Valve is available in many combinations of seats, O-Rings and body materials. Almost any media can be handled by the ECON-O-MISER and sizes range from 1/4" through 6". Made of bronze, aluminum, carbon steel, stainless steel or aluminum bronze. We'll be happy to furnish information or application data.

## THE ONLY VALVE IN INDUSTRY THAT SERVES AS BOTH VALVE AND UNION!



Complete, technical information in new "Comparison" bulletin.

Request EB 101 on your letterhead or fill in coupon.

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ADDRESS \_\_\_\_\_

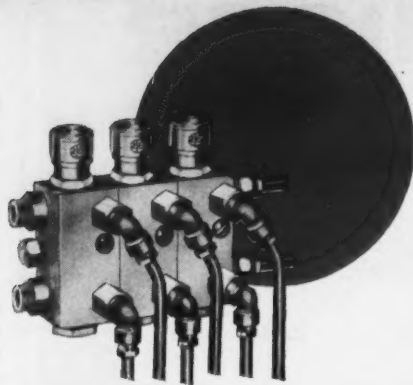
CITY \_\_\_\_\_ STATE \_\_\_\_\_

☐ Please forward bulletin EB 101. ☐ Please ask sales engineer to call for appointment. ☐ Send information on ECON-O-MISER FLANGE BALL VALVE.



**WORCESTER VALVE CO., INC.**  
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Check 1646 opposite last page.



**Type II Accumatic Valves** are fully automatic. Completely sealed for *clean* lubrication of power shovels, cement kilns, conveyors—any indoor or outdoor installation. For all fluid oils and most lighter greases. Available in four sizes to fit a wide range of applications.



## NEW SOLUTIONS

### Insulating Tanks

*From preceding page*

for fluorocarbon-filled spraying of urethane foam was in working out a suitable formulation. A formulation was needed that was not too sensitive to minor variations in proportioning and that doesn't require precisely controlled metering of components. Formulation also had to permit spraying on vertical surfaces without sagging. Thickness of 7" or more can be satisfactorily applied to a vertical surface.

Components used for the rigid foam are held in conventional spray paint pressure pot equipment and transported to spray gun by air pressure through hose. One pot contains a prepolymer which has been previously prepared by reaction of a tri-functional polyether with toluene diisocyanate. This is transferred to spray gun through one hose.

The other pot contains a catalyst, which is mixed with tri-chloro-fluoro methane. This mixture is transferred to gun through second hose.

In research on the project, new polyethers were developed. Polyether used is a polyoxypropylene derivative of trimethylol-propane, known as Pluracol TP440. This material, which has molar weight of about 440, is in form of liquid. Viscosity at 25°C is 625 cp. It has good stability.

Catalyst used is an alkanolamine called Quadrol, with a molar weight of 292. It is a viscous liquid. Viscosity of 44,100 cp at 25°C, decreases to 2550 cp at 50°C.

### Spray Gun

Along with formulations, a catalyst spray gun was developed that would provide dependable and continuous operation. All of spray equipment is conventional with exception of gun. In operation, the polyether is heated to lower viscosity and then flows to a fluid inlet on the gun. The catalyst and fluorocarbon mixture is supplied to a second fluid inlet on the gun.

# Accumatic®

AUTOMATICALLY LUBRICATES ALL BEARINGS

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An Accumatic Centralized Lubrication System delivers measured amounts of lubricants at proper intervals, to provide a better lubricant film on all bearing surfaces. Assures completely accurate lubrication, *even while machine is in operation*, with no interruption in production. Reduces lubricant consumption and prolongs service life of each bearing. Machines with many bearings or dangerously located bearings are lubricated from one central point . . . vital high-precision machines receive proper lubrication at all times.

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DIVISION  
**STEWART-WARNER**  
CORPORATION

Dept. K-119, 1850 Diversey Parkway, Chicago 14, Illinois

Check 1647 opposite last page.



Both components feed through separate passageways to the nozzle of the gun and are then mixed externally. Air coming to gun through third hose is at pressure of about 90 psi max.

#### Viscosity to 5000 cp

Spray gun will handle material with viscosity up to 5000 cp at 180-190°F at rate of up to 400 fl oz/min. Air consumption is about 40 cfm.

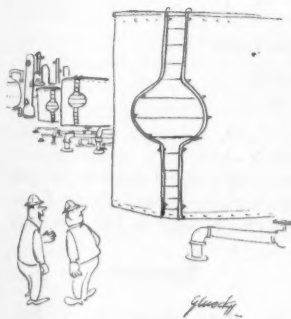
One of photos shows all of equipment needed for spraying of urethane assembled on an industrial hand truck. Included are an air regulator and transformer, two 10-gal supply tanks, necessary hose, heat exchanger and heater, and catalyst spray gun.

(System for spraying polyether urethane foam is development of Wyandotte Chemicals Corporation, Wyandotte, Mich., and additional technical information can be obtained from company on it. Information is also available on Pluracol TP440 and Quadrol, which are products of Wyandotte.)

Check 1648 opposite last page.

(P-JGC-505 spray gun and other equipment used for spraying urethane foam are products of The DeVilbiss Company, Toledo 1, Ohio.)

Check 1649 opposite last page.



*"I invented them—they allow passing someone going up or down."*

# Costs Go Down with Foam



IN VARNISH COOKING

Job-proved as fastest and most effective for all processing operations, Dow Corning silicone defoamers are available in different forms for different systems. Why not make tests on the materials that are giving you foam problems?

A generous trial sample is yours for the asking. Write for this FREE SAMPLE, giving an indication of your problem and the type of system — oil, aqueous, non-aqueous, food product or other. Address Dept. 3223 for prompt reply.

## Silicone Defoamer Beats Down Foam ...Defeats High Maintenance Cost

The chief engineer of a southern chemical plant periodically met real bugbears—foam boil-overs in a methanol-wood oil fractional distillation system. Such occurrences meant shutting down the still, while over 600 man hours were spent putting the unit back in condition.

That was before testing silicone defoamers. Now, foam's completely eliminated simply by adding only 5 parts per million of Dow Corning Anti-foam A. Boil-over clean-up man hours are nil. The chief engineer champions this silicone defoamer as the most effective system — says, "Without it, I'd simply go crazy."

If foam is fouling up your processing, putting you behind schedule and leaving you with too high a ratio of waste material, chances are you can lick foam once and for all — realize noteworthy savings through the use of Dow Corning silicone defoamers. Easy to use and economical, these silicone defoamers are widely used to overcome foam problems in processing varnish, paints, adhesives, asphalt, textile dyes, petrochemicals, foods and many other products.



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Check 1650 opposite last page.

## KELSOL 1209

### WATER SOLUBLE VEHICLE

(Chemically Modified Oil)

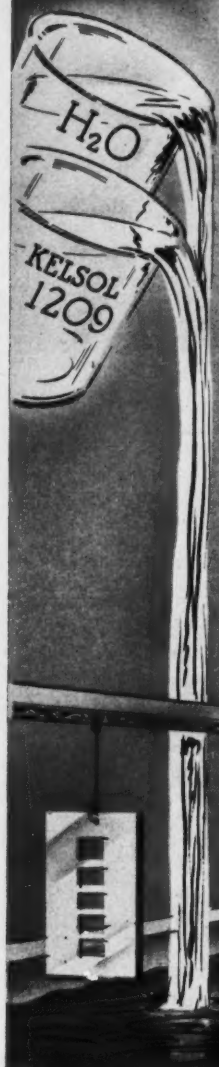
#### for Industrial Baking Primers

A new Kelsol... Kelsol 1209 producing nonflammable metal baking primers with superior adhesion, superior resistance to salt corrosion, water and humidity and superior enamel holdout. *Kelsol 1209 is high solids and completely miscible in water; needs no special additives for water thinning; and is simple to formulate and pigment in any type mill. Kelsol 1209 has excellent package stability (even against freezing damage) and may be applied by spray or dip... without foaming.*

Send coupon for free copy of the new technical service bulletin on Kelsol 1209

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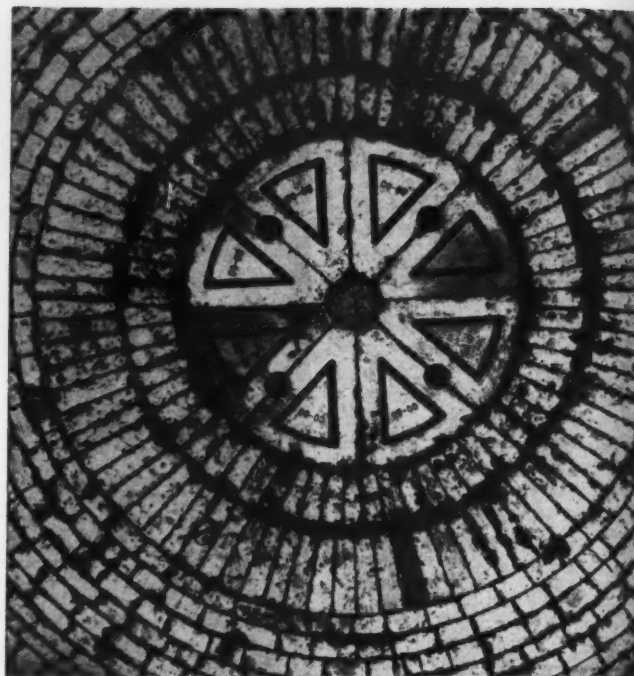
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Characteristics, performance, and formulae.

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Check 1651 opposite last page.

## NEW SOLUTIONS of processing problems



Dome of leach tank. Corrosive-abrasive slurry enters tank at high velocity through four holes. This inlet, subject to severest conditions, is lined with the triangular-shaped silicon carbide refractory bricks across area 3' in diameter

Placed in flash tank areas subjected to severest conditions at Cuban nickel plant —

## Refractory resists erosion-corrosion from high-velocity slurry

GORDON WEYERMULLER, Associate Editor

with L. F. ENGLE, Supervisor-Leaching  
Moa Bay Mining Co., Moa Bay, Cuba

Special shapes of a silicon carbide refractory, known as Carbofrax, are used in flash tanks in leaching operation of \$119 million nickel-cobalt plant of Moa Bay Mining Co. (subs. of Freeport Nickel Co.) soon to be placed on stream in Cuba.

This refractory is only material known to plant that will withstand the severely ero-

sive-corrosive conditions of the high-velocity slurry flow. Slurry velocity is 150 feet/sec.

### Operation

In the operation, Cuban laterites are leached with sulfuric acid at 525 psig and 475°F to recover nickel and cobalt. Discharge, a slurry of nickel and cobalt liquors and

tailings, contains 2.5 to 3.0% of free acid and 35 to 40% solids. This slurry is reduced to atmospheric pressure by passing through a valve and choke section into a flash tank.

Flash tank, eight of which are in use, is lined with the silicon carbide brick in areas subject to most erosion from corrosive slurry. One such area is slurry inlet at dome, which is lined with a 4½" thickness of triangular shaped SiC brick in center section 3' in diameter. Remainder of dome is lined with an acid-proof brick.

Bottom of flash tank, subject to impingement from slurry is lined with 2½" of acid-proof brick, over which is placed 2½" of the silicon carbide refractory brick.

Walls are lined with 4½" of the acid-proof brick. A 3/16" thickness of rubber is placed between brick and steel shell. Each tank is 15' 7" in height, with ID of steel shell being 8'.

#### Expected Life

Since leach tanks were only placed in operation in August 1959, they have not had much service as yet. However, the silicon carbide brick was used in pilot plant operation preceding plant construction for 240 days. Based on pilot plant results and improvements in design, a life of several years is expected for the silicon carbide material.

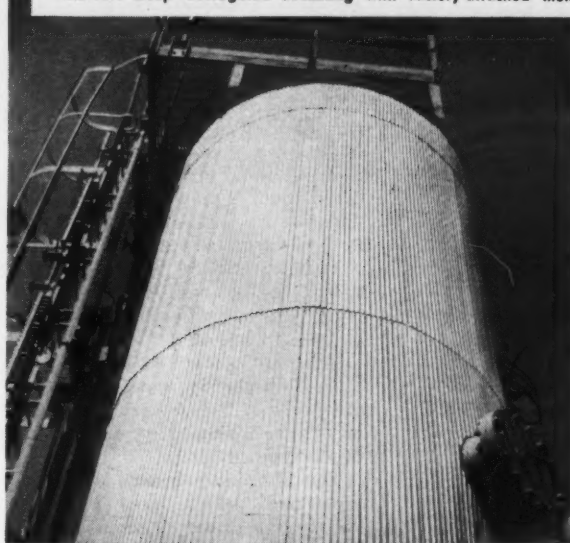
#### SiC Refractory

Carbofrax refractory contains 85% or more silicon carbide. Refractory is among the most wear-resistant materials known. It will withstand most acids. Material can be used at temperatures to 3000°F with good strength at high temperatures. It resists spalling and cracking. Thermal conductivity is about 10 times that of firebrick and approaches that of alloy steels at high temperatures.

(Carbofrax refractories are product of The Carborundum Company, Refractories Div., Perth Amboy, N.J.)

Check 1652 opposite last page.

Permanent protection for costly insulation on fractionators and caustic washers at Phillips Petroleum Co. refinery at Sweeny, Texas, is provided by New Childers Deep Corrugated Jacketing with factory-attached moisture barrier.



Protection for the costly insulation on this caustic washer was applied in one easy operation because Childers Jacketing has factory-attached moisture barrier.



These gleaming aluminum-covered towers will always look new! No need to paint Childers Jacketing . . . a savings that alone may pay full cost of jacketing plus installation!

Why 724 plants specified this . . .

## New Kind of Protection for Towers, Vessels & Tanks ... Childers Deep Corrugated Aluminum Jacketing:

Read why exclusive benefits of factory-attached moisture barrier are fast making Childers Jacketing the standard of the industry.

**Only Childers gives you this special feature:** Factory-Attached Moisture Barrier that (1) eliminates any danger of harm to the underneath side of the jacketing. And, (2) saves you time, labor and money because you apply jacketing with moisture barrier already attached . . . in one single operation.

**You also get greater strength and greater protection at less cost with Childers Cross-Crimp®.** Tests prove the rolled-in 3/16" cross corrugation increases the vertical strength and rigidity of .019" thick aluminum to that of plain .032" thick aluminum. Jacketing costs are consequently reduced as much as 1/3 when Childers Jacketing is used instead of ordinary sheet aluminum.

**It's easy to install Childers Deep Corrugated Jacketing.** Jacketing is applied with sheet metal screws used on both the vertical and circumfer-

ential lap. Screws may be omitted from circumferential lap when necessary to provide expansion joints.

**Comes in two corrugations:** 1¼" and 2½"; and four thicknesses: .016", .019", .020" and .024". The .019" and .024" thicknesses are made from roofing alloy for maximum life—recommended for normal jacketing of towers, vessels, and tanks. The .016" and .020" thicknesses are available in #3003-H-14 alloy.

**For a free sample of Childers Deep Corrugated Aluminum Jacketing with factory-attached moisture barrier, plus engineering data on how to safeguard your insulation, write to Childers Manufacturing Company, Dept. CP-21, P.O. Box 7467, Houston 8, Texas.**

In Canada, write direct to Peerless Mfg. Co., Sub-Post Office 28, Calgary, Alberta.



**For insulated lines Childers Aluminum Weather-Proof Jacketing in rolls goes on about 30% faster than ordinary weatherproofing, fits perfectly, never needs painting. Used with Childers exclusive 90° and 45° Ell-Jacs, this modern aluminum protection gives your insulated lines that well-dressed look from end to end.**

Only Childers makes available to you complete specifications and engineering data on aluminum jacketing in these catalogs: Refinery Catalog pp. 317-320; Sweet's Industrial Construction File pp. 10b/Ch; Chemical Engineering Catalog pp. 1011-1014.

Check 1653 opposite last page.



## NEW SOLUTION

to problems of

### HANDLING FREE-FLOWING MATERIALS

## Daffinaire PNEUMATIC CONVEYORS

Compact, rugged, constant-volume conveying systems eliminate costly complex installations. Unique, self-contained packaged units available in stationary and portable models for in-plant or outside applications.



Mobile Two-Way

Special Daffin volumetric feeder maintains constant material uniformity in transit. Daffinaire positive air-volume with automatic pressure control assures maximum efficiency. One-way (pressure) or two-way (vacuum-pressure) systems. Write for ideas . . . Daffin engineering and laboratory facilities are ready to help solve your problems.

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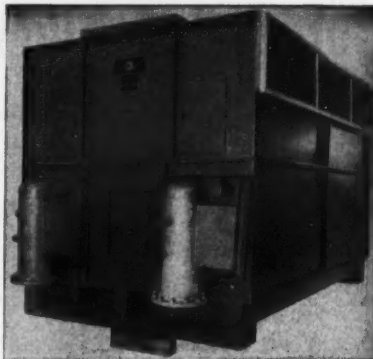
## REDUCE OPERATING COST of VACUUM SYSTEMS with this "AERO" (air-cooled) VAPOR CONDENSER

With free air the cooling medium, you use the least water, evaporated in the air stream. You save the cost and pumping of large volumes of condensing water.

Air-vapor subcooling reduces mixture evacuated from the system, saving in the operation of steam ejector or vacuum pump.

This air-cooled condenser gives you more capacity than other types at a substantial saving of steam and power. Water supply, scaling treatment and disposal problems are eliminated.

You get pure condensate, an improved product; often profit by recovery of residues now wasted. There can be no contamination of your product at any time; it never touches raw water. Condensing, of water, of solvents or of your product, is simplified; you have one, compact, easily maintained unit replacing both cooling tower and barometric or surface type condenser.



Niagara Aero Vapor Condenser Panel Casing construction gives access to all parts, saves first costs in shipping and installation.

Maintenance expense is low. Niagara Aero Vapor Condenser Panel Casing construction gives access to all parts, saves first costs in shipping and installation. Summer-winter dampers and Balanced Wet Bulb Control provide precise, year 'round adjustment of capacity to load.

Constant temperature, uniform products and maximum production 12 months a year are assured. Capacities up to 15 million BTU/hr.

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## NIAGARA BLOWER COMPANY

Dept. CP-11, 405 Lexington Ave., New York 17, N.Y.

Niagara District Engineers in Principal Cities of U. S. and Canada

Check 1655 opposite last page.

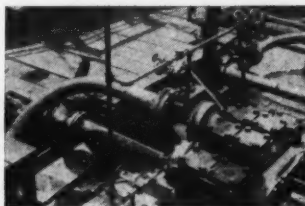
## NEW SOLUTIONS

### Aluminum-bronze alloy withstands sulfuric acid sludge

Valves and pipe, made of an aluminum-bronze alloy, have been successfully handling sulfuric acid sludge for more than a year at a large midwestern refinery. Sludge is acid-hydrocarbon mixture containing 40 to 75% acid, with the balance hydrocarbons. Strength of acid in sludge is 40 to 85%.

The equipment is an extension and replacement of existing facilities, which were constructed originally of another type of alloy.

The aluminum-bronze alloy pipe and valves have provided satisfactory corrosion and erosion resistance. Durability has been excellent and maintenance difficulties virtu-



CP Staff Photo

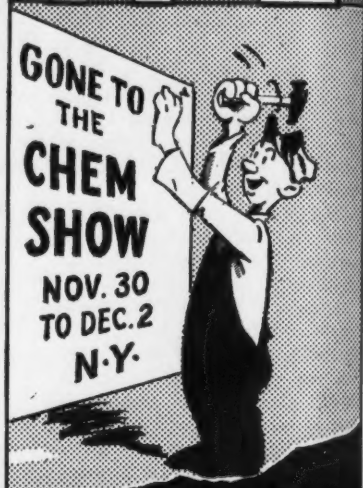
Aluminum-bronze alloy pipe and valves have successfully resisted effects of corrosion and erosion in handling sulfuric acid sludge, while greatly reducing maintenance problems

ally negligible. The rate of necessary repair and replacement has been greatly reduced, in comparison to that experienced with pipe utilized in original facility.

An important factor, influencing switch to aluminum-bronze alloy as material for new pipe and valves, was economy of fabrication and installation. This arises from fact that aluminum-bronze alloy can be heli-arc welded. Other considerations were anticipated good strength and corrosion and erosion resistance.

The sulfuric acid sludge passes through about 400' of aluminum-bronze alloy pipe. This newer installation is in close proximity to pumps, thus being subjected to shock effects.

# IPE



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with some of our  
Engineering staff, to  
tell you about the Big  
things happening in  
our Design and Re-  
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## INTERNATIONAL PROCESS EQUIPMENT CO.

DAYTON 1, OHIO

SUCCESSOR TO  
INTERNATIONAL ENGINEERING, INC.

Check 1656 opposite last page.  
CHEMICAL PROCESSING

## NEW SOLUTIONS

The three-, four- and six-inch pipe operates under average pressures in range of 70 to 100 psi. However, pressures may go as high as 700 to 800 psi. Temperatures encountered are to 250°F.

Finished fabrications of the aluminum-bronze alloy utilized in this application do not have to be stress-relieved in order to avoid stress corrosion cracking. This was made possible by addition of 1/3 of 1% of either tin or silver to basic copper-aluminum-iron composition. Addition of this property did not impair inherent ones of corrosion resistance and good mechanical properties and workability.

(Grade 8 alloy is product of Ampco Metal, Inc., 1745 S. 38th Street, Milwaukee 46, Wisconsin.)

Check 1657 opposite last page.

### Tablet purity guarded with plastic shields at Pfizer

Better protection to pharmaceutical tablets during coating operations is being afforded through use of acrylic plastic shields. Installed at Chas. Pfizer & Co., Inc., Brooklyn, N. Y., the plastic shields are used as dust covers on 18 large diameter coating pans.

Pans have three foot diameter aperture for addition of materials and observation of the coating process. In order to protect tablets, Pfizer engineers devised hinged Plexiglas dust covers, 38" in diam.

In the down, or closed position, the transparency of the plastic shields permits operators to easily inspect tablets. Covers lift vertically out of the way for addition of coating materials. Big advantage is breakage resistance of the plastic, since each complete coating cycle may involve opening of the pans up to 35 times.

(Plexiglas acrylic plastic is a product of Rohm and Haas Company, Washington Square, Philadelphia 5, Pa.)

Check 1658 opposite last page.

# Sn

## TIN CHEMICALS

LEAD STANNATE • LEAD STANNATE • DIBUTYL  
STANNATE • DIBUTYL TIN SULFIDE • ST  
ANNATE • DI-N-OCTYL TIN DICHLORIDE • ST  
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BUTYL TIN CHLORIDE • STANNOUS PYROPH  
OSPHATE • TRIBUTYL TIN OXIDE • STANNOUS  
DIPHENYL TIN CHLORIDE • STANNOUS OCT  
YLTIN • PENTACHLOROPHENATE • TRI  
PHENYL TIN OXIDE • DILAURYL TIN DIC  
BUTYL STANNONIUM DIACETATE • BIS DILA  
STANNOUS OCTOATE • DIMETHYL TIN OX  
PHENATE • TRIBUTYL TIN DODECYL SUCCIN  
IN DILAURATE • DIBUTYL TIN DI-2 ETHYL H  
STANNATE • MAGNESIUM STANNATE • DIBUTYL TIN  
SIUM STANNATE • DIMETHYL TIN DICHLORIDE • SODIUM  
CHLORIDE • TETRABUTYL TIN • STANNIC OXIDE • TE  
TRIBUTYL TIN ACETATE • STANNOUS CH  
BUTYL TIN ORTHOPHENYLPHENATE •  
BUTYL TIN ACETATE • STANNOUS  
STANNONIUM CHLORIDE • STANNONIUM DICHLORIDE

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## make effective STABILIZERS

Fruit flavoring

Soaps

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rubber

From resins and rubbers to foodstuffs and soaps, very small percentages of organotin and inorganic tin compounds have proved their ability to protect products against degradation through exposure to air, heat and light—or from the harmful catalytic effects of impurities or contaminants. The results have been entirely new life-expectancies or new application possibilities for a wide range of products.

Our "summary of reported stabilization applications" will be helpful to those concerned with the problems of product degradation. Request a copy as a "starter" and you can count on further help from M&T based on the detailed information contained in our extensive application files.

# M&T Chemicals

METAL & THERMIT Corporation,

Sn Sb P inorganics and  
Si Ti Zr organometallics

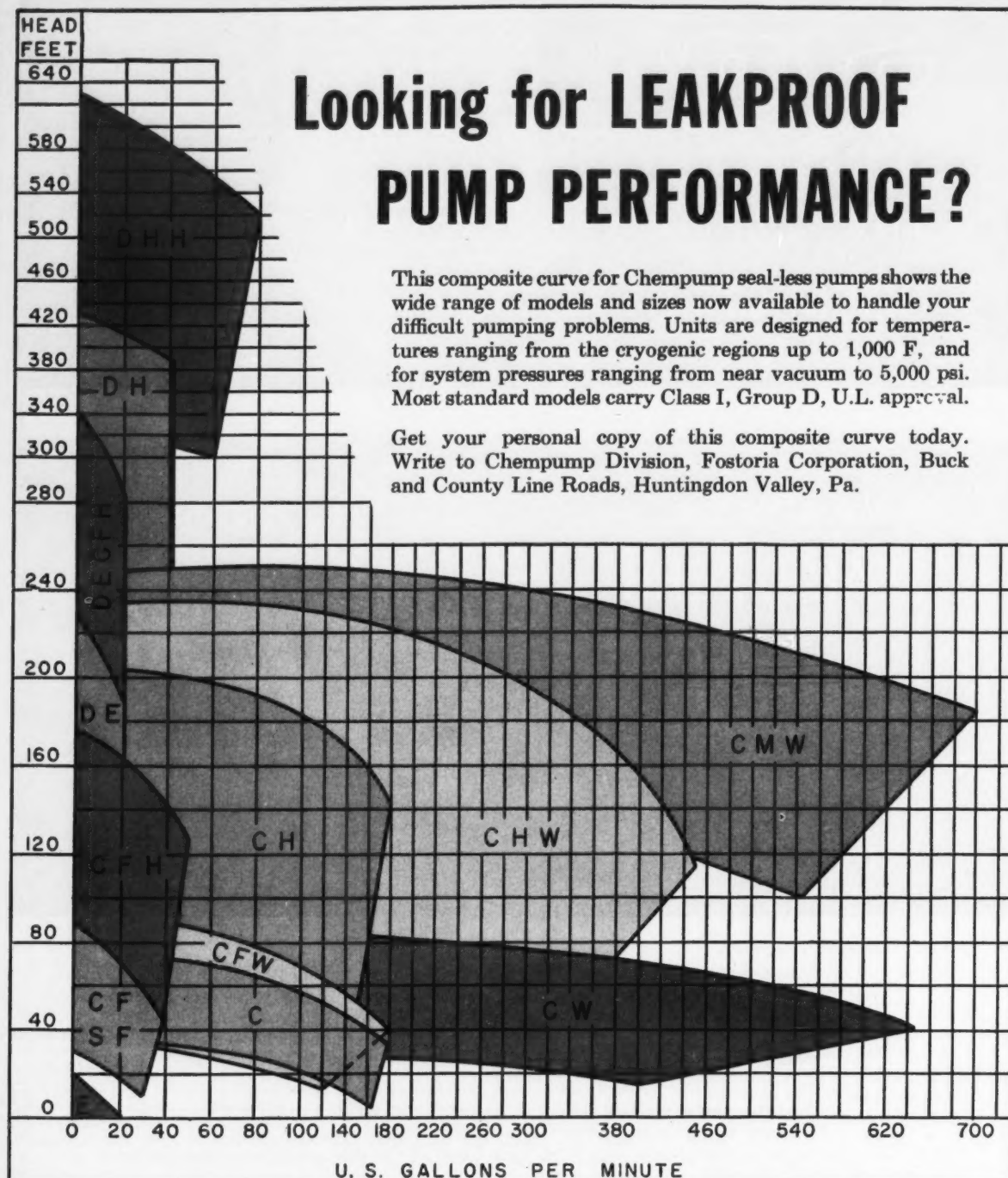
Rahway, N. J.

Check 1659 opposite last page.

# Looking for LEAKPROOF PUMP PERFORMANCE?

This composite curve for Chempump seal-less pumps shows the wide range of models and sizes now available to handle your difficult pumping problems. Units are designed for temperatures ranging from the cryogenic regions up to 1,000 F, and for system pressures ranging from near vacuum to 5,000 psi. Most standard models carry Class I, Group D, U.L. approval.

Get your personal copy of this composite curve today. Write to Chempump Division, Fostoria Corporation, Buck and County Line Roads, Huntingdon Valley, Pa.



This composite curve is intended to show relative head-capacity performance of Chempump seal-less pumps. It is to be used as a guide to specific model performance curves, available on request. All units are single stage except those with "D" in model designation which are two-stage pumps. Curves are based on 60-cycle operation.

## COMPOSITE CURVE

**C H E M P U M P**  
DIVISION • FOSTORIA CORPORATION  
HUNTINGDON VALLEY, PENNSYLVANIA

## NEW SOLUTIONS

### Glass-fiber-reinforced tanks in fish-oil processing

**Problem:** Wood fish-oil-processing tanks at Salem Oil and Grease Co. of Blubber Hollow, Massachusetts, proved unsatisfactory due to swelling and shrinking which resulted in tank joints filling up with salt deposits and in loss of water-tightness.

In tanks, wide variety of acid and alkali greases, in temperature range of 65 to 165°F, are treated with dilute solutions of hydrochloric, sulfuric, and nitric acids (pH of 1.5 to 6.0) and alkaline solutions.

**Solution:** Glass-fiber-reinforced tanks were installed to replace wood models.

**Results:** In four years of operation, there has been no salt-deposit damage. Tank maintenance has virtually been eliminated. Tanks have successfully resisted corrosive effects of hot acidic and alkaline greases.

(7710 Polyester-glass tanks are fabricated utilizing Atlat 382 polyester resin which is product of Chemical Division, Atlas Powder Company, Wilmington, Del.)

Check 1661 opposite last page.

(7710 Polyester-glass tanks are product of Haveg Industries, Inc., Wilmington 8, Del.)  
Check 1662 opposite last page.

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Do you have a pet nomograph that could save time for other **CHEMICAL PROCESSING** readers? If so, send it neatly and accurately drawn, with a double spaced, type-written description to:

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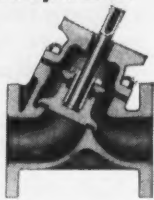
Check 1660 opposite last page.



## PROCESS PIPING POINTERS

### Lining stem diaphragm valves—ideal for automatic operation

This diaphragm valve, utilizing almost any hydraulic or pneumatic actuator, permits time-saving remote control of your process fluid flow. Bonnet has top flange which can be used for either bolted connection or threaded adapter mounting to actuator. Valve design features separate disc-diaphragm construction. Diaphragm is not subject to severe crushing or flexing, giving it longer life. Disc has durable, resilient insert that makes tight closure even on foreign particles—holds fluid even if diaphragm fails. Wide range of body, diaphragm and lining materials—in sizes ½ to 14 in. Available with actuator of your choice. Ask for Bulletin AD-1942—see below.

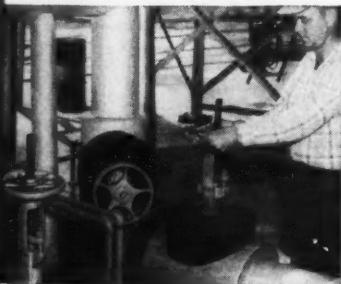


### Free-to-use motion pictures

#### Demonstrate special service valves

Without obligation, you can arrange to show two 16 mm. sound films that will inform and instruct valve specifiers and maintenance personnel on the most advanced designs in packless diaphragm and stainless steel valves. Take away literature supplied free for all viewers. Please give alternate booking date when requesting films. For arrangements, see below.

### Steel gates have long, maintenance-free record on Dowtherm

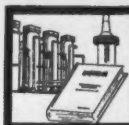


These solid wedge disc gate valves are still leak-free after more than 4 years on hard-to-hold Dowtherm. Seating shows no effect of wear under Dowtherm's nonlubricating qualities. For full facts see Crane ad on next page.

For literature or data on products listed above, please contact  
J. E. Bradbury, Manager,  
Chemical Sales Dept. No obligation.

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Gen'l Offices: 836 S. Michigan Ave., Chicago 5  
VALVES • FITTINGS • PIPE  
PLUMBING • HEATING • AIR CONDITIONING  
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## processing and engineering data

270

# Steam-trap Warming-up Load

WILLIAM RESNICK

5414 Cornell, Chicago 15, Illinois

One design criterion for steam traps on steam mains and risers is that they be sized to handle condensate formed when steam is turned on to main. Calculation of amount of steam condensate formed, in raising pipe from room temperature to saturated steam temperature, is simplified by use of accompanying nomograph.

Nomograph is based on heat-balance equation:

$$S = \frac{C_p P (T_s - T_r)}{\lambda}$$

where:

S = steam condensate, lb/lineal ft of pipe

$C_p$  = average heat capacity of steel, 0.12 Btu/lb °F

P = weight of pipe, lb/lineal ft

$T_r$  = room temperature, taken as 75°F

$T_s$  = saturated steam temperature, °F

$\lambda$  = latent heat of steam at  $T_s$ , Btu/lb

Data for P and  $\lambda$  were taken from standard sources.<sup>1,2</sup>

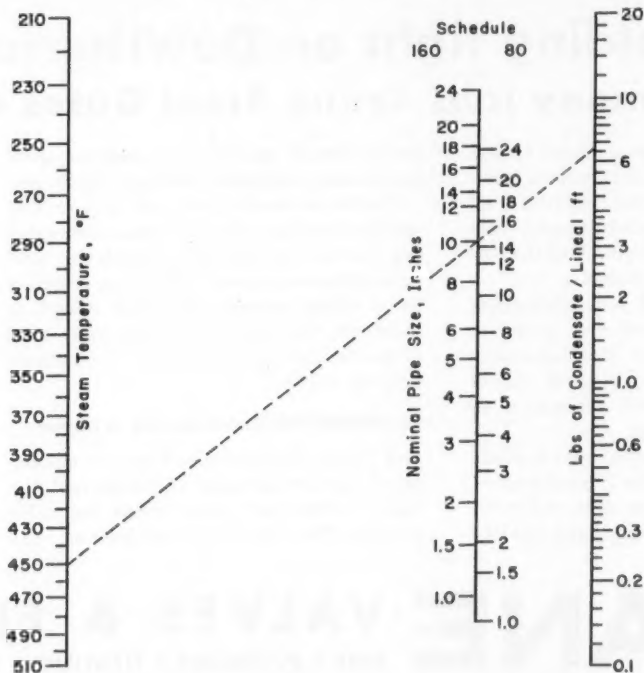
To use nomograph, straight line is drawn from steam-temperature scale to nominal-pipe-size scale and extended to right-hand scale. Reading on this scale will be amount of steam condensed per lineal ft of pipe, in raising pipe from 75°F to saturated steam temperature. Radiation losses and warming-up load due to flanges and fittings are not included.

### Typical Example

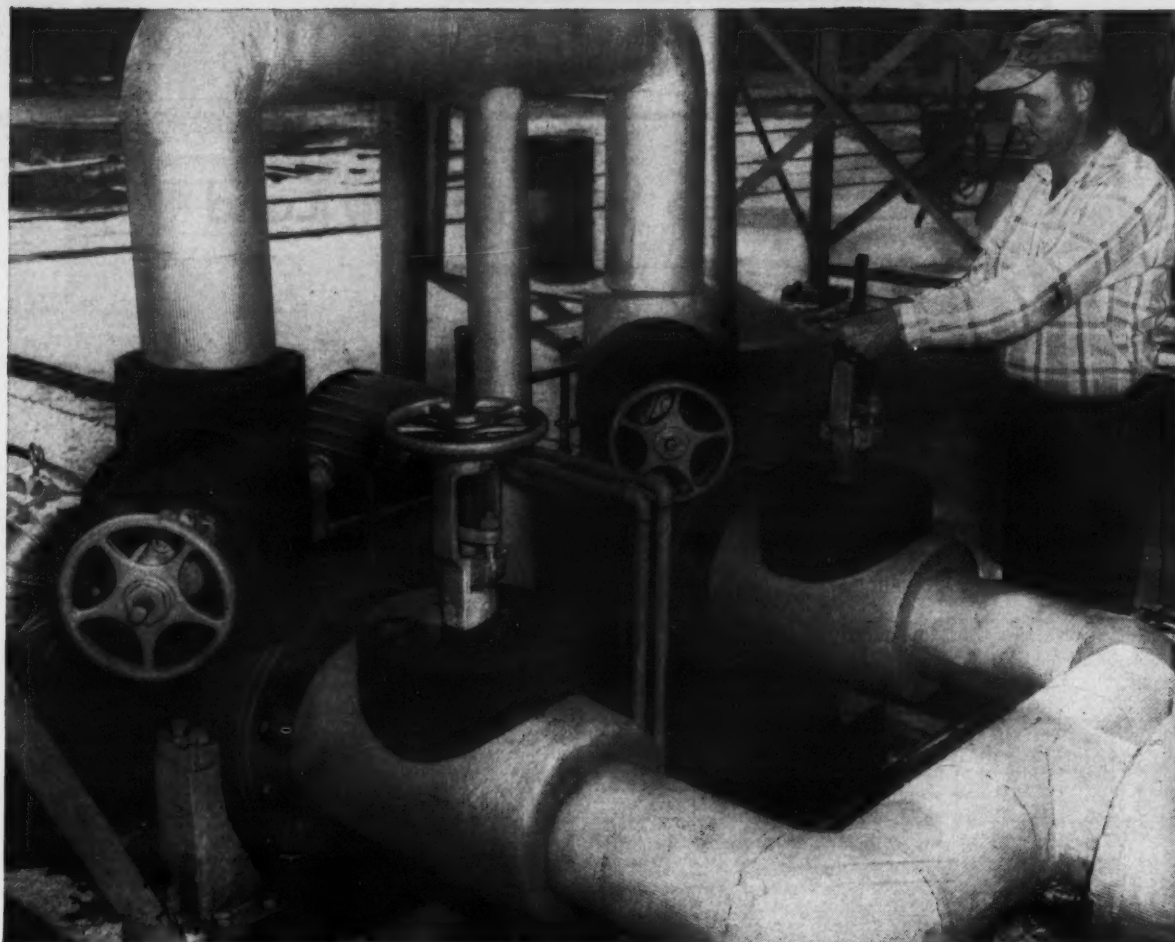
How much condensate must be removed from 100' of 10" Schedule 160 steam main when 450°F steam is turned on to main? From nomograph, condensate load will be 6.6 lb/lineal ft of pipe. Warming-up load for main will be 100 x 6.6 or 660 lb.

### LITERATURE CITED:

- 1) KEENAN, J. H., and F. G. KEYES, "Thermodynamic Properties of Steam," John Wiley & Sons, Inc., New York (1936).
- 2) PERRY, J. H., "Chemical Engineer's Handbook," Third Edition, McGraw-Hill Book Company, New York (1950).



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## Holding tight on Dowtherm . . . one of many jobs Crane Steel Gates do better

For more than four years these Crane 33XR 300-pound steel gate valves have given the Crosby Chemicals plant at Picayune, Miss., completely trouble-free service on 500 F Dowtherm. And they're still in perfect working order!

The hard-to-hold and non-lubricating characteristics of Dowtherm pose no problem for these valves. Seating materials—Crane Exelloy to No. 49 nickel alloy—insure the highest resistance to galling, wear and erosion.

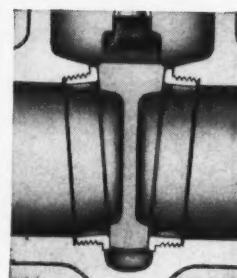
A long-lasting, tight stem seal is made with special packing for Dowtherm—and Crane steel castings give the body and bonnet extra strength and rigidity

for sustained smooth and positive operation under toughest working conditions.

On Dowtherm, steam, oil, gas or any service, you can rely on Crane steel gates for out-of-the-ordinary durability and maintenance savings. Their competitive price offers values you can't afford to overlook. Get full facts from your local Crane branch or wholesaler—or write to address below.

### PROOF that Crane quality is better

Get "Valve Performance Facts"—a booklet of 32 case histories on Crane installations. Gives you many ideas for valve savings. Your copy free on request.



T-head disc-stem connection prevents lateral strains on stem. Close-fitting disc guides maintain accurate seating, reduce wear.

# CRANE® VALVES & FITTINGS

PIPE • PLUMBING • HEATING • AIR CONDITIONING

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Check 1664 opposite last page.

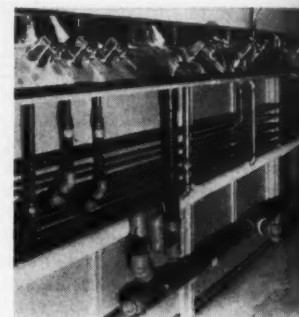
## NEW SOLUTIONS

### Research center served by over 10,000 feet of plastic pipe

Installation time and costs cut for huge project

More than 10,000' of semi-rigid plastic pipe comprise the interior plumbing network which handles both corrosive waste and fluids that must not be contaminated at Republic Steel Corporation's \$5,000,000 research center at Cleveland, Ohio.

One of largest interior networks utilizing plastic pipe (an acrylonitrile-butadiene-styrene formulation), installation was completed with substantial savings in time and costs. Thread-cutting opera-



Plastic pipe installation prior to installation of laboratory work-bench

tions were eliminated, since pipe could be cut with hand saw and joined by solvent welding to plastic fittings.

System carries away such chemicals as dilute sulfuric and nitric acids, and conveys distilled water and other fluids which must not be contaminated to various laboratories. Pipe services variety of research facilities ranging from radiation lab to glass-blowing lab.

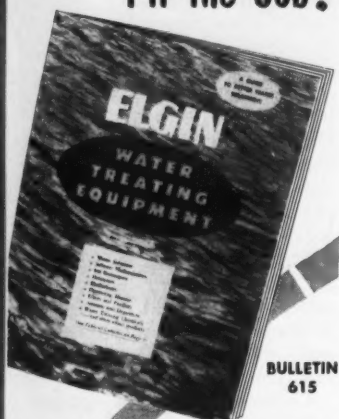
Pipe four" in diameter was used for vent stacks, while two" size and smaller was used for other applications such as drain lines, low-pressure air lines, and vacuum lines.

(SRK semi-rigid plastic pipe is a product of Republic Steel Corporation, 3105 E. 45th St., Cleveland 8, Ohio.)

Check 1665 opposite last page.

CHEMICAL PROCESSING

## Which Water Treating Equipment Will Best Fit the Job?



BULLETIN  
615

This new 24-page bulletin will help you decide

### See what it covers:

- Zeolite Water Softeners
- Demineralizers
- Dealkalizers
- Deionizers
- Filters
- Purifiers
- Degassifiers
- Deaerating Heaters
- Water Treating Chemicals

If you are confused about the many ways to treat water, this new bulletin will help you decide which is best for the job. It describes the various equipment used in treating water and what each is designed to do. Known for quality, dependability and advanced design, this equipment is based upon 50 years experience. For practical guidance in its proper application, the services of the Elgin representative nearest you is yours for the asking.

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processing and engineering data

271

## Equivalent Diameters of Tube Bundles

IRVING GRANET

Nuclear Energy Department  
Foster Wheeler Corporation  
and

D. S. DAVIS

Head, Department of Pulp and Paper Technology  
University of Alabama

Equivalent diameters of shell side of tube bundles, for use in heat-transfer and fluid-flow calculations, can be determined by means of accompanying nomograph (Figure 2).

Equivalent diameter,  $d_o$ , is equal to four times flow area, divided by wetted perimeter. Kern<sup>2</sup> states that, regardless of whether flow is cross or parallel, equivalent diameter should be taken as if flow were parallel to tubes.

On this basis, for square and equilateral triangular pitch (Figure 1), pertinent expressions appear in following table, where  $P$  is pitch and  $d_o$  is outer diameter of tube.

	Flow Area	Wetted Perimeter	Equivalent Diameter
Square:	$P^2 - \frac{\pi d_o^2}{4}$	$\pi d_o$	$\frac{4P^2}{\pi d_o} - d_o$
Triangular:	$\frac{\sqrt{3}}{4} P^2 - \frac{\pi d_o^2}{8}$	$\frac{\pi d_o}{2}$	$\frac{2\sqrt{3} P^2}{\pi d_o} - d_o$

### Typical Example

Use of nomograph, which was constructed through application of methods described previously<sup>1</sup>, is illustrated as follows: What is equivalent diameter of shell side of a tube bundle, where outer diameters of tubes are 1" and tubes are arranged on equilateral triangles so that pitch is 1.8"?

Connect  $P = 1.8$  and  $d_o = 1$  (on scale for equilateral triangular pitch) with a straight line. Note that this line meets  $d_o$  scale at equivalent diameter of 2.57".

### LITERATURE CITED:

- 1) DAVIS, D. S., "Nomography and Empirical Equations," Chapter 10, Reinhold Publishing Corporation, New York (1955).
- 2) KERN, D. Q., "Process Heat Transfer," McGraw-Hill Book Company, New York (1950).

nomograph on page 53

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Check 1666 opposite last page.

NOVEMBER 1959

Chemical Processing — November 1959

51



# You can find a bigger price . . . but not a better coupling

## LINK-BELT MOTOR COUPLINGS are priced low among high-quality flexible couplings

Here's your best value in the flexible coupling field . . . an ideal, low-cost answer for such motor-driven equipment as pumps, compressors, speed reducers and generators.

Besides substantial first savings, you realize the economies of fast, easy assembly and servicing. Allen head, spiral cam fasteners, which open and close with only a quarter turn, are a permanent part of the cover . . . no loose nuts or bolts.

There's economy in performance too. Geared design assures high capacity and durability . . . torque transmitting parts are accurately machined from cold-rolled steel. Especially important, compensation for both angular and parallel misalignment is **FREE**—i.e., without imposing loads on shafts and bearings.

Link-Belt Motor Couplings are immediately available off-the-shelf for shafts up to 2½".

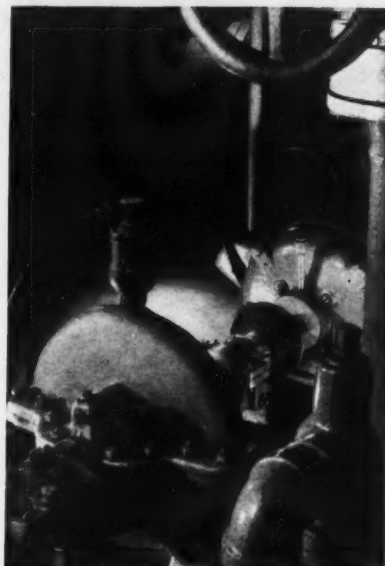


**FOLDER 2875** has complete information. For your copy, write your nearest Link-Belt office or authorized stock-carrying distributor.

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Visit our exhibit, 27th Exposition of Chemical Industries, Coliseum, New York, Nov. 30-Dec. 4, Space No. 165.

Check 1667 opposite last page.



### NEW!

#### CORROSIVE-DUTY COVER



This new cover provides positive protection for Link-Belt Motor Couplings against damaging effects of corrosive attack. Construction includes stainless steel fasteners, polyester fiber seals.

## LINK-BELT

GEARED FLEXIBLE COUPLINGS

## NEW SOLUTIONS

### Quintupled service life due from sparger tube fabricated of alloy

**Problem:** Short service life of sparger tubes exposed to sulfuric acid in processing of mixed fertilizer at Federal Chemicals Company, Columbus, Ohio, caused excessive materials wastage, replacement expense, and downtime losses.

Pipe, used at bottom of TVA-type rotary drum to spray sulfuric acid in process, is continuously submerged in wet mix of superphosphate and potash.

Corrosion enlarges sparger holes in relatively short time, resulting in waste of sulfuric acid and nitrogen. At best, tubes had to be replaced after processing 9000 tons of fertilizer. Replacing pipe required two hours downtime.

**Solution:** Sparger tubes of Hastelloy alloy C were substituted for previously used material. Standard one-inch, schedule 40 pipe was used. Pipe is threaded at one end for capping, and at other end for connection to acid line.

**Results:** Approximately 25,000 tons of product have been produced through alloy C sparger tube, and it is expected to handle an additional 25,000 tons before replacement. This represents up to five times better service.

(Sparger tube at Federal was fabricated of Hastelloy alloy C furnished by Haynes Stellite Company, division of Union Carbide Corp., Kokomo, Ind.)

Check 1668 opposite last page.

### Smoke nuisance stopped with recovery system in scrap metal plant

A pesky community smoke nuisance problem has been whipped by installing an efficient system for reprocessing scrap metal turnings at Federated Metals Division, American Smelting and Refining Co., Los Angeles, California. In the system, water and cutting oil are removed from aluminum alloy chips before

To page 54

CHEMICAL PROCESSING



## Equivalent Diameters of Tube Bundles

From page 51

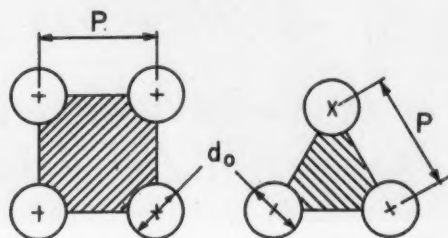


Figure 1

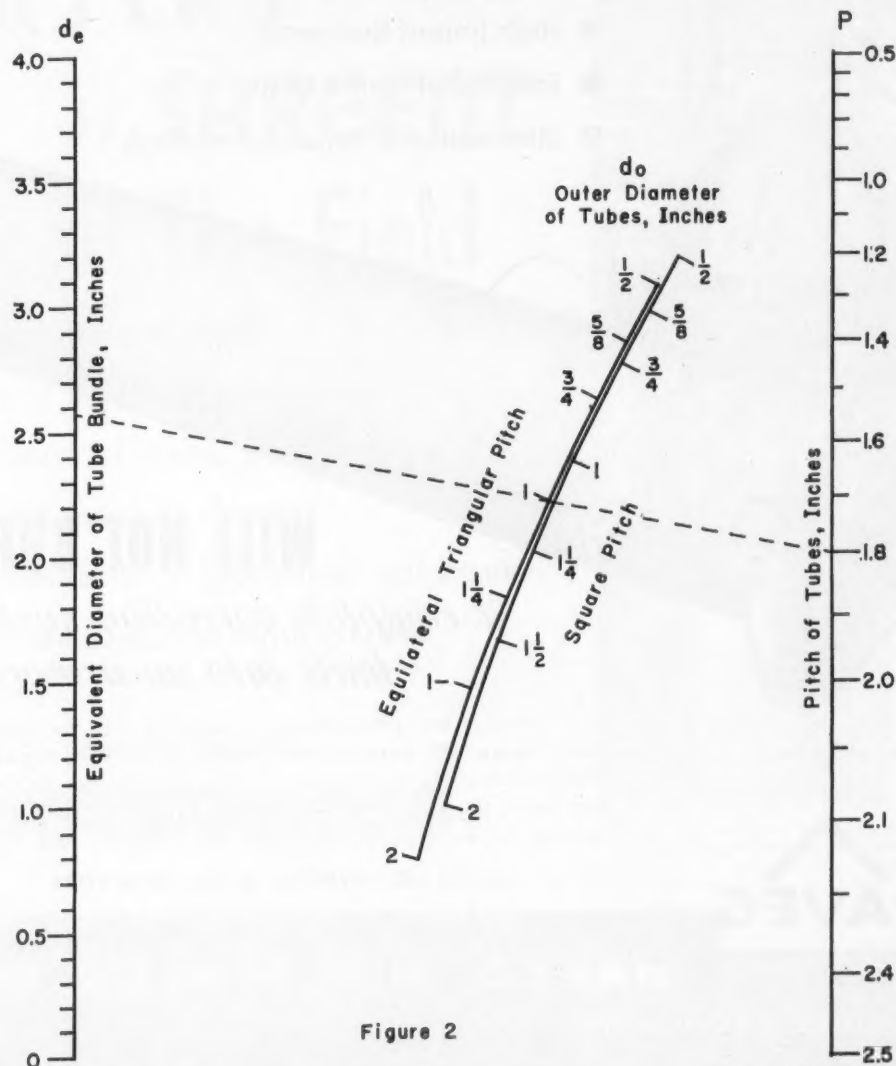
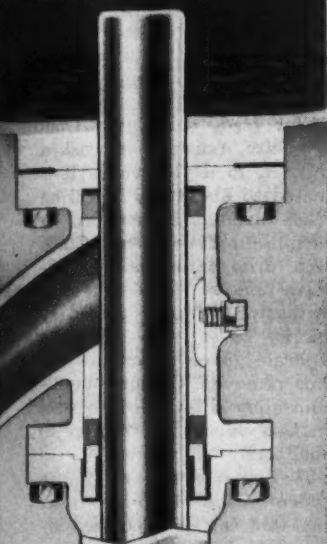


Figure 2

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*a*  
PUSH BOTTOM VALVE  
that  
WILL NOT CLOG UP!

Designed for Chemical and  
Pharmaceutical Industries



### Strahman RAM TYPE Drain Valves

The Strahman Drain Valve is the only valve that cannot clog up. It is so designed that in the closed position the piston or ram extends up into the tank thus preventing any possibility of the outlet becoming plugged.

In the open position, full and unobstructed flow is assured as the piston is drawn down into the bonnet leaving a completely open passage for the material passing through.

Write direct for complete catalogue

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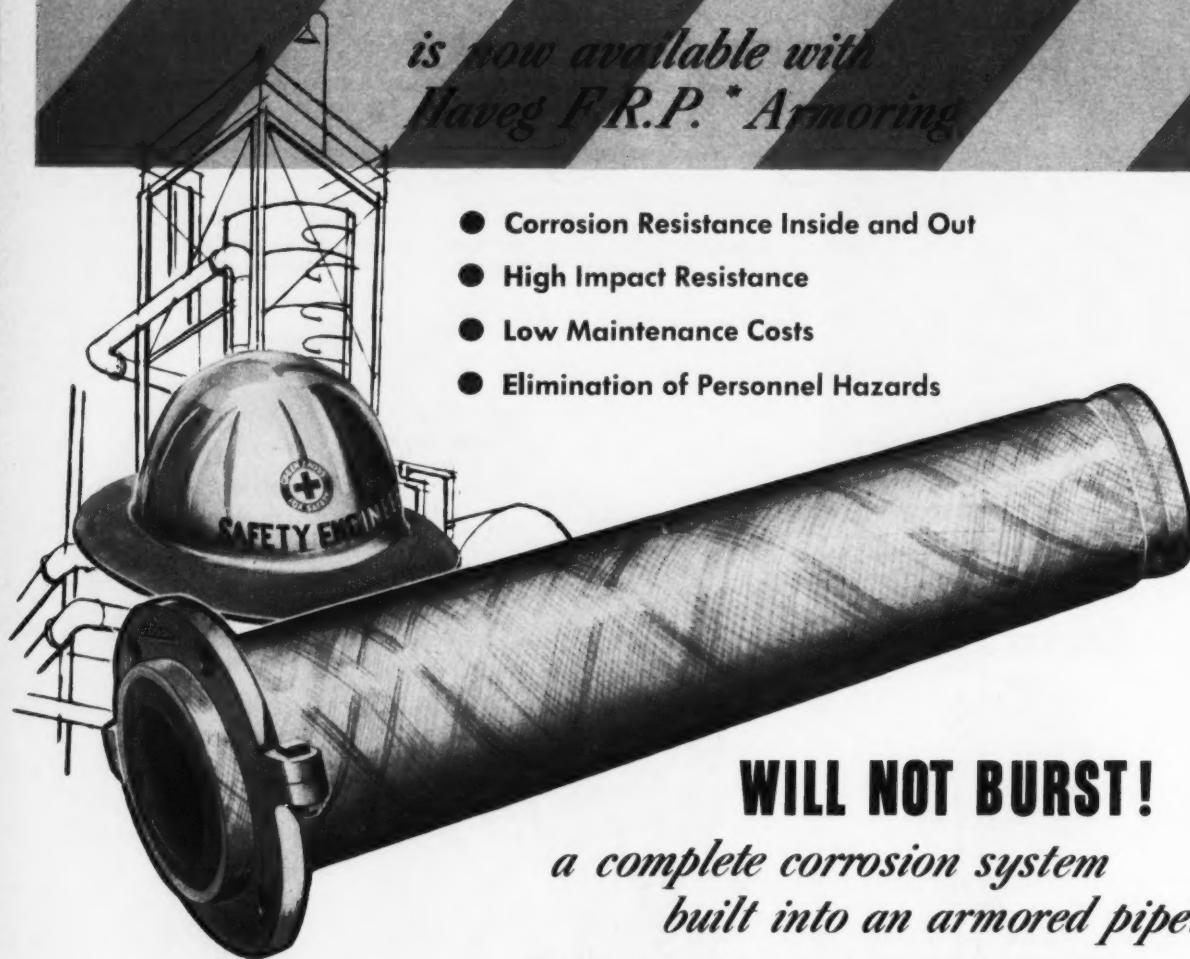
Check 1669 opposite last page.

NOVEMBER 1959

*at last...*

# ABSOLUTE SAFETY *with* COMPLETE CORROSION RESISTANCE

*is now available with  
Haveg F.R.P.\* Armoring*



- Corrosion Resistance Inside and Out
- High Impact Resistance
- Low Maintenance Costs
- Elimination of Personnel Hazards

## WILL NOT BURST!

*a complete corrosion system  
built into an armored pipe.*

\*Polyester Reinforced Fiberglass

Here at last is the ultimate in resistance with the maximum in safety. Haveg FRP\* Armoring now permits the use of Haveg pipe and fittings in many new applications. It is also available for use with fume duct, tanks, towers or wherever strength requirements have previously ruled out the use of plastic equipment. We invite your inquiries.

BOOTH 546 CHEMICAL SHOW—NEW YORK

# HAVEG

## HAVEG INDUSTRIES, INC.

900 GREENBANK ROAD • WILMINGTON 8, DELAWARE

Check 1670 opposite last page.

## NEW SOLUTIONS

*From page 52*

the scraps are sent to smelter.

If turnings were charged to smelter prior to being treated, a serious smoke and fume problem would result. Also, wet chips can be explosive if they are pushed beneath surface of molten aluminum in smelter.

Included in the recovery system are a rotary dryer and after-burner, crusher, magnetic separator, and various pieces of conveying equipment.

Wet feed, containing from ½ to 40% moisture, is crushed and fed to dryer where it is heated to about 350°F. Oil on dried turnings is removed by burning in after-burner. Chips then drop into bucket conveyor and are raised to a level so that they can be passed by gravity over the magnetic separator. Iron impurities are thus removed. Cleaned aluminum alloy chips fall into steel buckets, ready for transfer to smelter.

Two operators control entire system. Other types of turnings that can be processed include steel, copper, and brass alloys. Results achieved with system meets strict air pollution requirements of the Los Angeles Air Pollution Control District.

(Standard rotary dryer and after-burner were manufactured by Standard Steel Corporation, 5001 South Boyle, Los Angeles 58, California.)

Check 1671 opposite last page.

**Attrition mill reduces  
asbestos waste  
in fiberization**

**Problem:** Asbestos-fiberizing equipment, used at The Garlock Packing Company's Palmyra, New York, plant, resulted in approximately 12% of fiber opened becoming shorts and filter waste. Also, only fiberization control was by feed rate.

Fiberization of crude fibers with this equipment necessitated roll crushing and two passes through vertical opener. Milled fibers were passed either once through the vertical opener or once through





A 36" swing-head single-roll attrition mill and cyclone condenser, in asbestos fiberizing role, have resulted in reduction from 12 to 1½%, in amount of shorts and filter waste

the willow. Also utilized was a ceiling condenser.

**Solution:** A 36" swing-head single-roll attrition mill and cyclone condenser were installed to handle complete fiberizing operation. Mill is equipped with shredding plates, fabricated steel shell, and independently driven feeder. Plates are manganese-steel spike-tooth type with pyramid-shaped teeth.

Hand wheel at end of mill provides instant adjustment and disc-pressure control. Hand lever separates disc with one motion.

If unbreakable substances enter mill constant pressure, maintained by disc spring, provides automatic release and adjustment. Safety spring keeps heads from drifting together when mill is running empty.

**Results:** With space between two sets of attrition-mill plates, battering of fibers causes fluffing rather than a grinding. Reduction to 1½% of shorts and filter waste through condenser has been experienced. Adjustment capability on plates permits greater flexibility of equipment than had previously been possible.

(Single-runner attrition mill is product of Sprout, Waldron & Company, Inc., Muncy, Pa.)

Check 1672 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

## CREATIVE ENGINEERING TRANSLATED INTO PRACTICAL PRODUCTION

**S**ARGENT imaginative engineering has created numerous "firsts" that are now standard in many industries . . . better drying equipment and methods for better production and better products at less cost.

The first gas-fired rubber dryer was a Sargent. The first flashless powder was dried in a Sargent. The first gas-fired conveyor dryers for tobacco, for grain, for wool stock, all were Sargents. New man-made

textile fibres and innumerable other products have come to the market dried by special-design Sargents that were designed, engineered and built to the exacting needs of product and of production.

From small lab and table models, from tray and truck dryers, through huge capacity, multi section, multi-stage conveyor dryers and rotary dryers, a Sargent is engineered to serve profitably and well for many years to come.

# DRYERS by SARGENT Lead The Field

- in operating economy
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- minimum of maintenance requirements
- easiest, quickest cleanout
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- fastest installation, with erection costs the lowest on the market

Let us give you details.

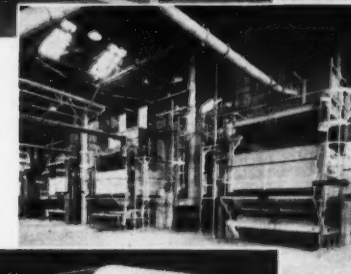
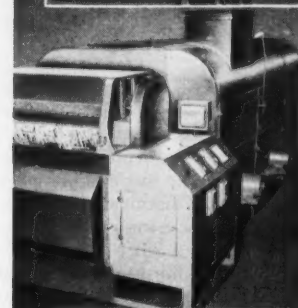
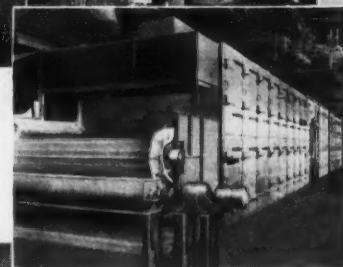
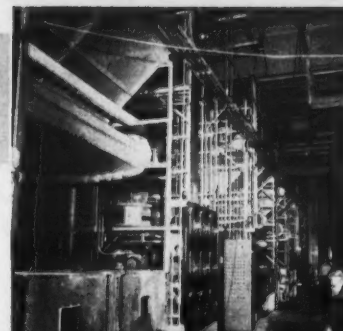
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Sargent installations pictured above: Bank of 4 synthetic rubber dryers, 3-pass, gas-fired, at Good-year Tire and Rubber Company, Houston, Texas • Two-stage Kaolin dryer with Sargent double-hopper extruder, at American Industrial Clays, Sandersville, Ga. • Pilot plant dryer with extruder and cooling sections. Remarkably compact and efficient. At a well-known chemical company • Four Sargent dryers for England's first general purpose (bulk) synthetic rubber plant. Built under Sargent license — installed at International Synthetic Rubber Co., Ltd., Hythe, Southampton • Two-compartment truck dryer with controlled even heat distribution through all trucks, at a large chemical company.

Check 1673 opposite last page.



Blended with other compounds to form  
a synergized product that provides  
better protection in cooling  
water systems —

## Chromate inhibitors furnish effective low-cost corrosion control

GORDON WEYERMULLER, Associate Editor

**C**HROMATE compounds are good inhibitors that prevent corrosion by forming a protective film over surface of metal. At Nalco Chemical Co. they are made even more effective by blending with other chemicals that improve the results achieved in a water treatment program. Freedom from fouling is a benefit obtained by blending.

Addition of other chemicals acts to improve corrosion inhibitor performance and prevent deposits on metal surface. Using several chemicals

in a synergistic combination decreases the quantity of inhibitor necessary for protection. The synergized system might be said to be one in which the effect of the blend is much greater than the sum of the individual components would indicate.

At Nalco chromate usually comes to plant as sodium or potassium chromate or bichromate in bags or fiber drums. Chromate is blended with other corrosion inhibitors or synergists.

Factors influencing the

choice of synergistic inhibitors are metals involved, operating conditions, design of the system, and water characteristics.

In most cases, chromate is the base material and is present in larger quantity. However, chromate may be added as the synergist for another base material. Ferrocyanide might be used as synergist where there is a waste disposal problem or contaminant which must be reduced to permit use of chromates.

When using inhibitor, pH

control is important. If pH is not controlled, protective film may be removed. For some applications, inhibitor is made to buffer at 7.0 pH. For others, pH is buffered at 9.0. For the higher pH, an alkaline chromate such as  $\text{Na}_2\text{CrO}_4$  may be used. For a lower pH, an acid chromate such as  $\text{Na}_2\text{Cr}_2\text{O}_7$  may be base material. Chromate must be in the hexavalent form, with the characteristic orange or yellow color, to act as an effective inhibitor. The reduced form, trivalent chromium, is



One favorite form of chromate inhibitor is 3"-diameter ball briquette which facilitates handling, measuring required quantity, and feeding

Sodium bichromate and other materials are added to mixer in first step for production of inhibitor

CP Staff Photo



Chemicals are given additional mixing and are ground in this machine. Then they are molded in form of balls and pass up conveyor to drying oven

CP Staff Photo



Chromate ball briquettes are removed from dryer in wire cage prior to packaging in fiber drums

CP Staff Photo



not effective as an inhibitor.

Although Nalco furnishes a number of standard chromate inhibitors, in many cases a special inhibitor may be supplied to meet an unusual problem. Company maintains a large research organization to delve into nature of problem and provide an effective solution to it.

#### Quantity Required

The use of synergized corrosion inhibitors provides not only superior results but also cuts down quantity of inhibitor needed to provide protection. Amount used depends on type of system to be protected such as open or closed system and corrosive factors present.

An example of an open recirculating system is a cooling tower which is open to atmosphere where cooling is obtained by evaporation. Makeup water is continuously added to replace evaporation loss and blowdown. An example of a closed system would be a compressor cooling system which is completely closed to the atmosphere where cooling is obtained through heat exchange equipment. Makeup water is not added except to replace leakage.

In an open system, if chromates were used alone, a residual 300 ppm of  $\text{CrO}_4$  would be required to avoid pitting. The use of synergistic chemicals cuts this down to 50 ppm chromate residual or less with excellent corrosion control being experienced, 3 mpy (mils per year penetration) or less. Of course, inhibitor must be replenished as fresh water is added to system.

No. 360 inhibitor for cooling tower systems is in form of 3"-diameter balls. It contains 63% chromate salts. A 1% solution has pH of 3.9. Material is slightly hygroscopic.

For a closed system up to 1000 ppm or more chromate may be added. Reason the quantity here is so much higher is that system to be protected is more complex requiring complete control of corrosion. Hence, every effort is made to reduce corrosion

# NEW from BAKER & ADAMSON®

$\text{SbF}_3$	Antimony Trifluoride, Purified	
	Chloral Hydrate, U. S. P.	
$\text{CrO}_2\text{Cl}_2$	Chromyl Chloride, Tech.	$\text{CCl}_3\text{CH}(\text{OH})_2$
	Cobalt Chloride, Anhy. Powd. Reagent	$\text{CoCl}_2$
$\text{CoCr}_2\text{O}_7 \cdot 1\frac{1}{2}\text{H}_2\text{O}$	Cobalt Dichromate, Tech.	
	Ferric Pyrophosphate, Soluble, N. F. VII	
	Iso Amyl Alcohol, Reagent Grade	$(\text{CH}_3)_2\text{CHCH}_2\text{CH}_2\text{OH}$
$\text{MgCrO}_4 \cdot 5\text{H}_2\text{O}$	Magnesium Chromate, Tech.	

# 11

## FINE CHEMICALS

new products ... new grades, strengths, forms  
for you to investigate and work with

	Manganous Nitrate, 58% Solution, Electronic Grade	$\text{Mn}(\text{NO}_3)_2$
$\text{K}_2\text{SO}_4$	Potassium Sulfate, N. F. VII, Crystal & Powder	
	Silicon Tetrafluoride, Purified	$\text{SiF}_4$

Here are some of our newest fine chemicals—one or more of which may fill a need or provide a lead for you. Two of these products—silicon tetrafluoride and chromyl chloride—have not previously been readily available. Others are new in grade, or strength, or physical form. All are additions to the B&A line of more than 1000 reagents and fine chemicals which are recognized as offering the highest in chemical quality and purity.

Development of these products is typical of B&A's

responsiveness to industry needs. As America's leading producer of reagents and fine chemicals, Baker & Adamson continues to set the pace in chemical purity with new products ... new levels of purity for established products ... new forms, new grades, new strengths.

If you would like information about any of the 11 fine chemicals listed above, or about B&A's many other high purity chemicals, please call or write your nearest Baker & Adamson sales office.

**BAKER & ADAMSON®**  
Fine Chemicals



**GENERAL CHEMICAL DIVISION**  
40 Rector Street, New York 6, N. Y.

Check 1674 opposite last page.



Looking For Cost Saving Ideas?

# VISIT OVER 500 "CLASSROOMS" OF CHEMICAL PROGRESS



At the 27th Exposition of Chemical Industries you can attend over 500 "classes"—informative displays that show the newest advances in plant and process equipment, instruments and controls, material handling and packaging equipment, corrosion resistant materials *plus* special sections for chemicals and laboratory equipment and supplies.

This "course" will keep you abreast of new ideas that may help you cut costs, increase production and improve your product performance. Here you can see and learn more in a few days than is possible in any other manner.

Plan now to attend—and bring your key associates with you. Just one idea picked up here will make their visit worthwhile.

Write today for free advance registration and hotel information.

**27th**  
**EXPOSITION OF CHEMICAL INDUSTRIES**  
**N. Y. COLISEUM • NOV. 30—DEC. 4.**

Management: International Exposition Co., 480 Lexington Ave., New York 17, N. Y.

Check 1675 opposite last page.

## CHEMICAL MATERIALS

rate completely to zero. Since inhibitors seldom need to be replenished, greater quantity does not add much to expense. Since a number of different metals often need to be protected in a closed system, inhibitor is usually more complex.

No. 38 chromate inhibitor for closed system is in form of almond-shaped pellets. It contains 70.3% chromate salts. Density is 65 lb/cu ft and pH of 1% solution is 9.2-9.4.

### Physical Form

At Nalco chromate inhibitors are produced as pellets, balls, or in pulverized form. Many customers particularly like the 3"-diameter orange balls, each of which weighs a little over a pound. This form simplifies handling as well as dosage.

In some plants, the ball form offers flexibility of changing inhibitor concentration as conditions change. For example, customer plant may use treatment program calling for use of two or more different types of chemicals or ball briquettes such as chromate balls (yellow), and organic inhibitor balls (black). Rate of addition of these can be varied as operation changes.

Nalco can furnish an economical ball feeder for chromate inhibitor balls. This consists of a chamber large enough to contain several of the balls and through which the water to be treated is bypassed. Other feeding methods used are solution tank and chemical feed pump or the use of tube feeders.

### Manufacture

In the production of chromate inhibitors at Nalco, the dry powders are first added to a mixer. In next step they go to a miller for further mixing and grinding.

If form is the 3"-diameter balls, the homogeneous mixture is molded into this shape. Heat may or may not be used according to composition of material. There is considerable art involved in making a ball that will not stick to mold or crumble.

# CPH-4

## Diglycol Laurate Se

### for use as

Emulsifier  
Anti-foamer  
Carrier  
Solvent  
Wetting Agent  
Detergent  
Solubilizer  
Lubricant  
Plasticizer  
Emollient

### for use in production of

Paper	Paint
Cosmetics	Cleaners
Textiles	Metals
Lubricants	Polishes
Pharmaceuticals	
Chemical Specialties	

### check these features

- Anionic
- Water dispersible
- Self-emulsifying
- Wide compatibility
- Light in color
- Slightest odor



THE FLAME AND THE FLASK  
Symbol of Quality

Ask for information  
about other  
Fatty Acid Esters  
available for  
specific applications.

*The C. P. Hall Co.*  
CHEMICAL MANUFACTURERS

5245 W. 73rd St., Chicago 38, Illinois  
NEWARK • AKRON • CHICAGO  
MEMPHIS • LOS ANGELES

Check 1676 opposite last page.

CHEMICAL PROCESSING

After molding, balls pass up a conveyor to a drying rack. They are removed in wire cage and packaged in fiber drums. Material furnished in pellets or in pulverized form is packed in multi-wall paper bags.

(Among the chromate chemicals used in Nalco inhibitors are products of Solvay Process Division, Allied Chemical Corporation, 61 Broadway, New York 6, N.Y.)

Check 1677 opposite last page.

(For further information on chromate inhibitors contact Nalco Chemical Company, 6294 West 66th Place, Chicago 38, Ill.)

Check 1678 opposite last page.

#### Static charge build-up in processing textiles halted by agent

**Uses:** Applications requiring a cationic polyamine anti-static agent particularly textiles in production or aerosol anti-static treatment for finished goods.

**Features:** Provides non-durable protection against static charge formation. Gives soft, drapery hand to fabrics.

**Description:** Soluble in water at room temperature, carbon tetrachloride, xylene, toluene, isopropanol, methanol, Synasol, and perchlorethylene, agent is furnished in syrup form.

**Characteristics include:** pH (1% solution), 5.8; density, 1.04 (8.67 lb/gal); excellent stability. It is 100% active.

(Aston AP anti-static agent is product of Onyx Oil & Chemical Co., 184 Warren Morris Sts., Jersey City 2, New Jersey.)

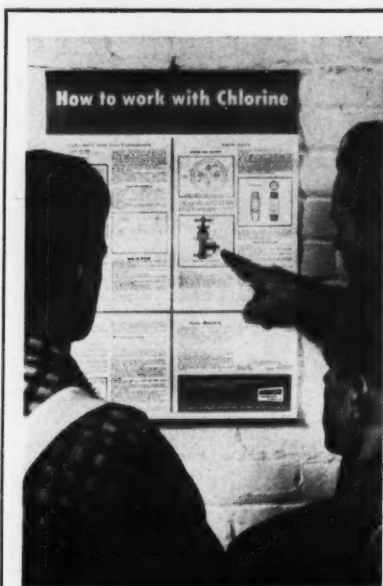
Check 1679 opposite last page.

**Liquid urethane resin prepolymer** for rigid foams, and catalyst systems, are described in series of three technical data sheets including formulations, handling, and product specification. Bul 334-1, -2, -3 — Thiokol Chemical Corporation, 780 N. Clinton Ave., Trenton 7, N. J.

Check 1680 opposite last page.

## BRIEFS

on a safety chart for chlorine...  
sodium benzoate that won't ball...  
a grease that won't burn or corrode



#### Post this safety chart wherever your men work with CHLORINE

You can cut down accidents by placing this chlorine safety information right where your men are working.

This practical wall chart uses clear diagrams, everyday language. It tells your men how to handle tank cars, cylinders and ton containers.

It shows how various valves are constructed and how they should be operated.

Sections on first aid and emergency measures give advice that can minimize the effects of an accident, should one occur.

Mail the coupon for this chart. Maybe you'd like a copy of our Chlorine Manual, too. Its 76 pages are full of useful chemical and engineering information.



#### Flake-form sodium benzoate... instantly dissolving

Like many fine powders, sodium benzoate may give trouble in processing by forming into balls when you wet it.

If this ever happens in your process, you can stop it for good—with Hooker flake sodium benzoate. As you see here, this fine flake form starts dissolving in water almost instantly.

Thanks to an unusually careful flaking-screening operation, the Hooker

flake stands shipping well—won't dust.

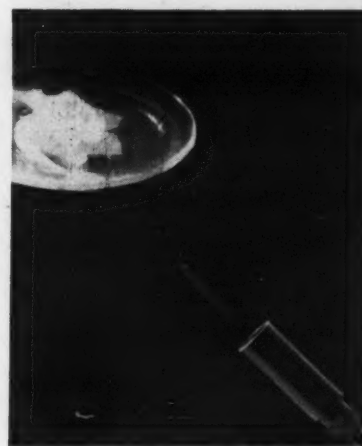
It's available in two grades:

**U.S.P. grade** is over 99% pure, contains a max. of 0.2% benzoic acid, 0.5% water.

**Technical grade** is also a highly pure 98%. It assays 0.4% max. benzoic acid. The rest is water.

You can get either grade in powder form, too.

Order a trial drum now and you can see for yourself how this quick-dissolving flake can speed your operations. For complete technical data, check the coupon.



#### You can't burn this grease... or break it down

Where could you use a grease that is completely nonflammable...

- a grease that won't break down in the presence of oxygen, hydrogen peroxide, or concentrated mineral acids or alkalis
- a grease that's applicable up to 200° C. (with an oil base stable to 300°C.)
- a grease that is odorless and non-toxic?

Yes, we are describing one grease. It's named Fluorolube.®

It's a high-density polymer of trifluorovinyl chloride. It's available in many grades, ranging from low-viscosity, colorless oils to opaque greases.

All are excellent lubricants.

For complete specifications and typical properties, send the coupon for our Fluorolube Data File.

For more information on chemicals discussed above, check here:

- ☐ CHLORINE SAFETY WALL CHART ☐ SODIUM BENZOATE  
☐ CHLORINE MANUAL ☐ FLUOROLUBES

Clip and mail to us with your name, title, and company address. (When requesting samples, please use your business letterhead to speed delivery.)

#### HOOKEr CHEMICAL CORPORATION

511 FORTY-SEVENTH STREET, NIAGARA FALLS, N. Y.

Sales Offices: Chicago Detroit Los Angeles New York  
Niagara Falls Philadelphia Tacoma Worcester, Mass.  
In Canada: Hooker Chemicals Limited, North Vancouver, B. C.

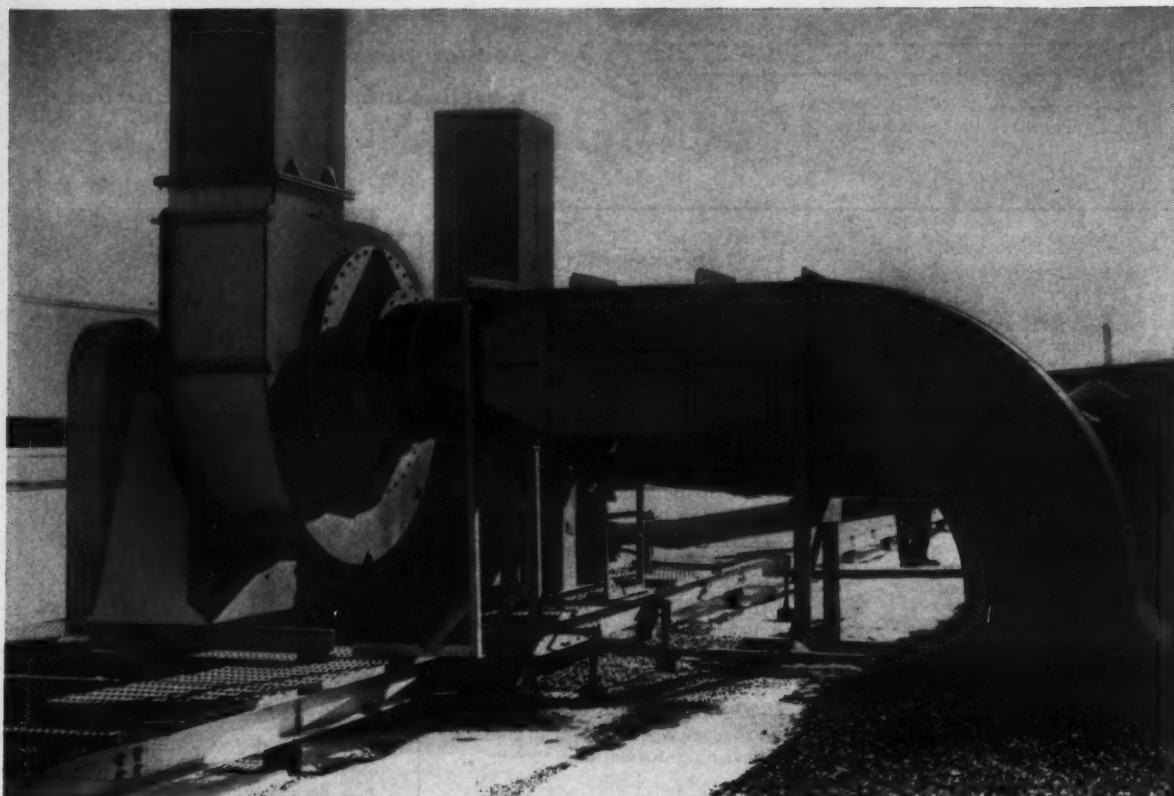


Check 1681 opposite last page.



Another new development using

## B.F. Goodrich Chemical raw materials



Blowers and fans, ductwork and fittings and bolts, nuts and washers are all manufactured of Geon by Industrial Plastic Fabricators, Inc., Norwood, Mass. B. F. Goodrich Chemical Company supplies the Geon polyvinyl material.

### Blower and ductwork of Geon solve corrosive fume problems

The manufacturer of this air handling equipment can promise buyers efficiency as high after years of operation as right now. The equipment is made from sheet made of Geon rigid vinyl. Unlike conventional coated blowers and fans which usually handle just one type of chemical fume, this equipment withstands corrosion and residual build-up of nearly all chemicals. Installations are often lower in cost because of weight savings.

Sheet of Geon rigid vinyl is extremely versatile for fabrications

like this—it can be heat-formed to a variety of shapes, precision welded, machined and finished to close tolerance. The flexibility made possible with Geon makes possible new design features impractical with other materials because of prohibitive costs.

Geon rigid vinyl materials are providing new applications and new markets for a broad variety of manufacturing companies. For information about the many forms in which Geon can be obtained, write Dept. AL-9, B.F. Goodrich Chemical

Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.



B. F. Goodrich Chemical Company  
a division of The B. F. Goodrich Company



GEON polyvinyl materials • HYCAR rubber and latex • GOOD-RITE chemicals and plasticizers

Check 1682 opposite last page.

## CHEMICAL MATERIALS

### Atomized ferrosilicon doesn't decompose

**Uses:** Heavy media separation for ores, particularly iron, lead, and zinc.

**Features:** Round form and smooth, shining surface of individual atomized ferrosilicon grains resist corrosion without producing contamination between iron and silicon during process. Atomized form attains greater pulp density than ground form, but has lower adhesion loss and equal strength.

**Description:** Liquid ferrosilicon is atomized by air or steam; resulting particles quenched in water; and powder, which after draining still contains 10% water, is dried and screened.

Atomized powder neither decomposes nor rusts—a problem with ground powder. Fineness or coarseness of grains is determined by steam pressure, temperature, and composition of melt.

(Atomized ferrosilicon 15% is available from Westco Chemicals, 6850 Tujunga Ave., North Hollywood, Calif.)

Check 1683 opposite last page.

### Tall oil fatty acid with lighter color, improved stability

**Uses:** Tall oil fatty acid is expected to find initial application in surface coating vehicles, liquid soap products, synthetic detergents and plasticizers.

**Features:** Product is light and has improved color stability characteristics.

**Description:** Industrial enamels formulated with this tall oil fatty acid fraction show excellent initial color and resistance to yellowing. Liquid soap products can be made to higher soap solid content. Product is designated Acintol FA 1.

(Acintol FA 1 tall oil fatty acid is product of Arizona Chemical Company Inc., 30 Rockefeller Plaza, New York 20, N. Y.)

Check 1684 opposite last page.



## THAT'S INTERESTING

### Thar's 'gold' in cans

A Natal, South Africa newspaper carried an ad stating an herbalist was offering a \$22,400 reward for recovery of four sealed cans of medicine washed away from his home during a flood. Ad specified the reward would be paid only if cans were still sealed.

### Nose knows best

There's no chance to get off the scent at Shulton Inc.'s plant at Clifton, N. J. Perfumers let their nose know what's best in a sealed-off "sniffery."

A special ventilation system changes air in the eight-foot square room every minute.

Incoming air not only is "conditioned" and filtered in usual way, but it is passed through a bed of activated carbon which removes all traces of odor.

For more information on product at right, specify 1685 see information request blank opposite last page.



## CELANESE TRIMETHYLOLPROPANE...

help yourself... there's 15,000,000 lbs.  
*and the price is down 4¢ a pound*

First to go on stream with a commercial process for making trimethylolpropane, Celanese transformed this chemical from a laboratory promise to a practical material for the paint industry. Now, with this latest price reduction, you can make coatings even more economically... with better quality, thanks to the properties of trimethylolpropane.

In alkyd paints, for example, trimethylolpropane permits improvements in hardness, dry time and curing rate as compared with glycerol-based alkyds. Gloss and color retention are improved. Paint formulations made with trimethylolpropane have better stability against heat... greater resistance to overbake. They can take outdoor exposure and weather. They adhere strongly and withstand alkalis and detergents.

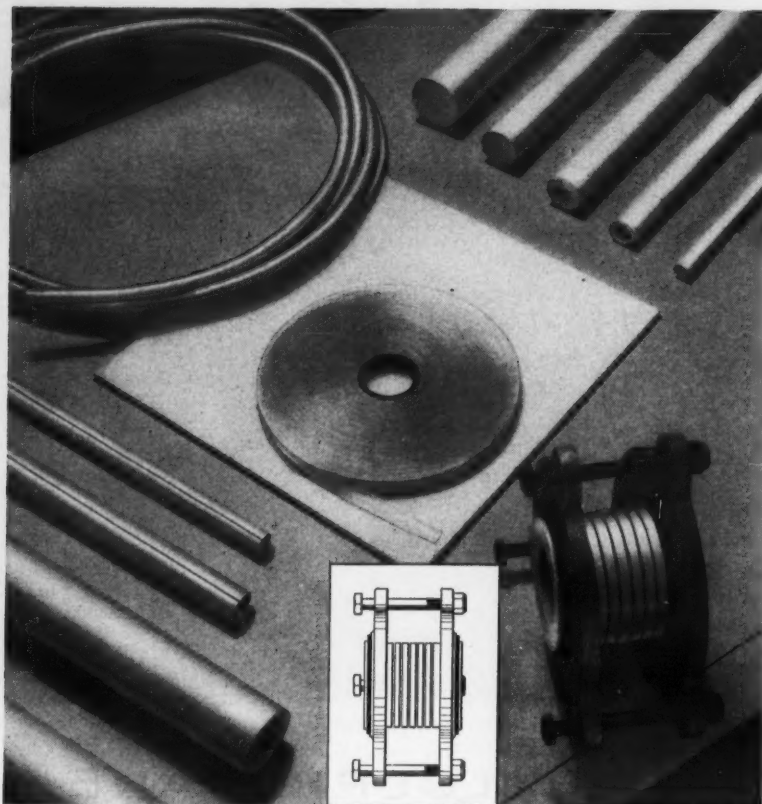
Today, a major Celanese production facility at Bishop, Texas, is geared to turn out more than 15 million pounds per year of high quality trimethylolpropane. Celanese also provides technical advisory services to manufacturers. For an interesting bulletin which describes the properties of this versatile chemical and offers data on the formulation and preparation of alkyd and urethane coating resins, write to: Celanese Chemical Company, a division of Celanese Corporation of America, Dept. 591-K, 180 Madison Avenue, N. Y. 16. Celanese®

*Canadian Affiliate:* Canadian Chemical Company Limited, Montreal, Toronto, Vancouver

*Export Sales:* Amcel Co., Inc., and Pan Amcel Co., Inc., 180 Madison Avenue, New York 16, N.Y.



# LOOK TO R/M TO MEET ALL YOUR TEFLON\* NEEDS



**R/M—headquarters for "Teflon" products.** R/M's complete line includes sheets, rods, tubes, tape, thin-wall tubing (available with permanent color striping) and bondable "Teflon." New "Teflon" expansion joint features square convolutions for greater strength. Other "Teflon" parts, extruded, molded or machined to your exact specifications, can also be supplied.

"Teflon's" many remarkable properties have established it as an important material for use in chemical processing equipment. Yet when you select "Teflon" for a particular job, you solve only part of your problem. Equally important is the selection of a source of supply you can depend on for both competent engineering assistance and the production capability needed to meet your exact specifications and quantity requirements. This complete

"Teflon" service is yours from R/M.

A pioneer in "Teflon" application and fabrication research, R/M offers design guidance that can help assure maximum part performance, and its ample production facilities can supply "Teflon" in the form best suited to your needs. Learn more about R/M's complete "Teflon" service—and how it can benefit you—by contacting your nearest R/M district office. Or write Plastic Products Division, Manheim, Pa.

\*A Du Pont trademark



## RAYBESTOS-MANHATTAN, INC.

PLASTIC PRODUCTS DIVISION FACTORIES: MANHEIM, PA.; PARAMOUNT, CALIF.

Contact your nearest R/M district office listed below for more information or write to Plastic Products Division, Raybestos-Manhattan, Inc., Manheim, Pa.

BIRMINGHAM 1 • CHICAGO 31 • CLEVELAND 16 • DALLAS 26 • DENVER 16 • DETROIT 2 • HOUSTON 1  
LOS ANGELES 59 • MINNEAPOLIS 16 • NEW ORLEANS 17 • PASSAIC • PHILADELPHIA 3  
PITTSBURGH 22 • SAN FRANCISCO 5 • SEATTLE 4 • PETERBOROUGH, ONTARIO, CANADA

RAYBESTOS-MANHATTAN, INC., Engineered Plastics • Asbestos Textiles • Mechanical Packings • Industrial Rubber Sintered Metal Products • Rubber Covered Equipment • Abrasive and Diamond Wheels • Brake Linings • Brake Blocks • Clutch Facings • Laundry Pads and Covers • Industrial Adhesives • Bowling Balls

Check 1686 opposite last page.

## CHEMICAL MATERIALS

**Low-foam latex paints  
made by using this  
anti-foaming agent**

**Uses:** To prevent foam in styrene-butadiene, polyvinyl acetate, acrylic and alkyd modified latex paint formulations.

**Features:** Liquid product has no phase separation and evidences excellent stability both at room temperature and elevated temperatures. It has no deleterious effects on film properties.

**Description:** Product, Nuodex AF-7, is a clear, amber liquid with the following physical properties:

Color, max (Gardner)	13
Odor	Mild
Sp gr (80°F)	0.925-0.940
Lb/gal (80°F)	7.70-7.85
Viscosity, max (Gardner)	D

Product clouds at 20°F and recovers at room temperature. For most formulations a concentration of 0.1-0.2% based on total paint weight should be adequate.

(Nuodex AF-7 anti-foaming agent is a product of Nuodex Products Company, Division of Heyden Newport Chemical Corp., Elizabeth, N.J.)

Check 1687 opposite last page.

**Polymeric dialdehyde  
has high reactivity  
and versatility**

Offers low-cost polymers, high aldehyde content

**Uses:** Dialdehyde starch has potential use in plastics and polymers, as a textile finishing agent, as an ingredient in coatings and adhesives, or as a gelatin hardener.

**Features:** Polymeric dialdehyde has high reactivity. It is a potentially low-cost polymer with high aldehyde content offering interesting structural versatility.

**Description:** Produced by oxidation of starch with periodic acid, three grades of product are available ranging from 50-90% oxidized. Material is a finely divided, practically odorless solid similar in appearance and color



We mine Copper, Iron, Zinc and Sulfur and are basic producers of their chemical derivatives. Our technical know-how in these basic materials is your assurance of exacting quality control and strict uniform consistency.

## COPPER

- > **Copper Sulfate**
- > **Monohydrated Copper Sulfate**
- > **Copper Carbonate**
- > **Cupric Chloride**

## SULFUR

- > **Sulfuric Acid**
- > **Liquid Sulfur Dioxide**
- > **Sodium Hydrosulfite**
- > **Chlorosulfonic Acid**
- > **Para Toluene Sulfonic Acid, Anhydrous**

## IRON

- > **Ferric Iron Sulfate**

## ZINC

- > **Monohydrated Zinc Sulfate**
- > **Zinc Oxide**

## MANGANESE

- > **Manganese Sulfate**
- > **Monohydrated Manganese Sulfate**
- > **Manganous Oxide**

For Further Information or Samples, Make Request on Your Firm's Letterhead.



615-29 Grant Building, Atlanta 3, Georgia

Check 1688 opposite last page.

CHEMICAL PROCESSING



to starch. Water content is less than 10%.

Reaction with urea produces polyglucosylol mono-urea or polyglucosylol diurea. These products as well as their corresponding oxymethyl and methoxy methyl derivatives are considered useful in plastics, adhesives, laminating, molding, and textile or paper treating. Compound reacts with melamine or derivatives of melamine to produce materials useful for manufacture of crease and crush-proof fabrics. It will also cross-link polymer chains of polyamide resins.

(Sumstar dialdehyde starches are product of Miles Chemical Company, Division of Miles Laboratories, Inc., Elkhart, Indiana.)

Check 1689 opposite last page.

#### Clear liquid detergents possible with product

Low-turbidity tetrapotassium pyrophosphate contains minimum of potassium triphosphate and other trace impurities which cause unsightly cloudiness in general liquid detergents.

Use of high-assay product will enable detergent manufacturers to produce clear, cloudless products. Commercial quantities are available.

(Tetrapotassium pyrophosphate is available from Inorganic Chemicals Division, Monsanto Chemical Company, 800 N. Lindbergh Blvd., St. Louis 66, Mo.)

Check 1690 opposite last page.

#### Beta-alanine-2-C<sup>14</sup>

... is now being produced in commercial quantities in chromatographically pure form. An isotopically labeled compound, it is used for research in the mechanism of amino acids.

(C<sup>14</sup>-labeled beta-alanine is product of Research Specialties Co., 200 S. Garrard Blvd., Richmond, Calif.)

Check 1691 opposite last page.

## HOW *HERCULES* HELPS...



Photo courtesy Asplundh Tree Expert Co., Jenkintown, Pa.

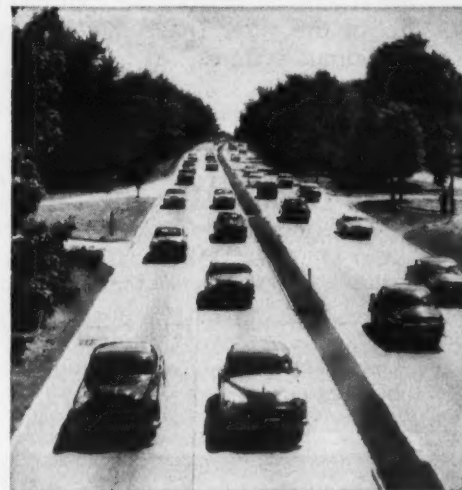
**MEN OVER THE WIRE**—Spiralloy®, the filamentwound glass fiber-reinforced plastic material made by Hercules, is being used for booms on truck-mounted cranes of utility companies and tree surgeons. Since it is a nonconductor of electricity, Spiralloy

is particularly well-suited for this application. Lighter than aluminum and stronger than steel, it has unmatched high-strength-to-weight ratio. Spiralloy-wound cylindrical structures also are gaining acceptance in such fields as missiles, boats, pipe, and storage tanks.



**INCREASE SHOE LIFE**—A new Hercules material now goes into specially impregnated leather shoe soles that actually "breathe" and have many times the wearability of leather soles. Developed in cooperation with the U. S. government, this product has already proven itself in many types of footwear.

**MAKE DRIVING ECONOMY**—Among the many Hercules items that go into your automobile is Dalpac® 4, Hercules di-tert-butyl-p-cresol. This antioxidant is added to gasoline at the refinery to inhibit gum formation, stabilize color and help maintain engine cleanliness. It means more trouble-free miles of driving for you.



# HERCULES

**HERCULES POWDER COMPANY**

900 Market Street, Wilmington 99, Delaware

CHEMICAL MATERIALS FOR INDUSTRY



089-7

Check 1692 opposite last page.



# BORON TRIFLUORIDE

OR ITS DERIVATIVES—as a catalyst  
for your process

## BORON TRIFLUORIDE, $BF_3$

Gas available in cylinders at 1800 psi

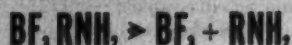
Catalyzes alkylations, polymerizations, bodying of oils.

Often only a fraction of 1% is required—simplifies purification of product after reaction.

## BORON FLUORIDE MONOETHYLAMINE

$BF_3 \cdot C_2H_5NH_2$ , Crystalline solid, m. p.  $89^\circ C$ .

This and other amine complexes of  $BF_3$  find use in elevated temperature curing of epoxy and other types of resins. By dissociating at elevated temperature by the follow reaction:



the release of  $BF_3$  can be controlled, allowing control of the cure. These materials are suitable for anhydrous systems.

**ZINC FLUOBORATE, 40% SOLUTION,  $Zn(BF_4)_2$** , used for curing resins on cloth to achieve "wash and wear" finishes. Here, again, the activity is due to release of  $BF_3$  at elevated temperatures.



Useful for emulsion applications that will be followed by heat curing.

## INORGANIC COMPLEXES

Ammonia  
Orthophosphoric Acid

## ALIPHATIC AND ALICYCLIC N COMPLEXES

Ethylamine  
Piperidine  
Triethylamine  
Tri-n-butylamine

## ALIPHATIC N + O COMPLEXES

Acetamide

## ALIPHATIC AND ALICYCLIC OXYGEN COMPLEXES

Acetic Acid  
Ethanol  
Tetrahydrofuran

## AROMATIC N COMPLEXES

Pyridine  
Aniline

## AROMATIC OXY COMPLEXES

Phenol



**The Harshaw Chemical Co.**

1443 East 9th Street • Cleveland 3, Ohio

Chicago • Cincinnati • Cleveland • Detroit • Hong Kong • London  
Newark • Los Angeles • Philadelphia • Pittsburgh

## CHEMICAL MATERIALS

**Formed shapes of  $MgO$  have properties like single crystal**

**Uses:** Obtaining refractory and electrical properties of a single crystal of magnesium oxide in shape of tubes, crucibles, plates, discs, bars and rods.

**Features:** Material offers on a commercial scale formed shapes having refractory and electrical properties approaching those heretofore obtained only with single crystals.

**Description:** Vitreous, high-purity magnesium oxide ce-



Characteristics of  $MgO$  ceramic shapes approach those of single crystals

ramic is available in a variety of shapes. For metallurgical work, product combines high purity of present, somewhat porous  $MgO$  crucibles with double strength and greater resistance to molten-metal attack. Thermal conductivity is  $0.08 \text{ cal/sec}/^\circ C/\text{cm}^2/\text{cm}$ .

(Magnafrax 0340 magnesium oxide is product of Refractories Division of The Carborundum Company, Perth Amboy, N. J.)

Check 1694 opposite last page.

**Rubber-tearing bond produced by adhesive for silicone rubber**

One-part, one-coat product does not stain

**Uses:** Bonding room-temperature-vulcanizing silicone rubber to metal.

**Features:** Product provides bonding during room-temperature cure of silicone rubber compounds. Rubber-tearing bonds are produced which have excellent environmental resistance to broad tempera-

Write for samples or for information which you think will help you with your problem.

More than forty years experience may help us help you.

Check 1693 opposite last page.

## CHEMICAL MATERIALS

ture conditions. One-part, one-coat adhesive does not stain.

**Description:** Bonds are obtained with a wide variety of commercially available RTV silicone rubbers to steel, aluminum, brass, copper and other metals. In addition, adhesive will bond silicones to glass, porous ceramics, cured epoxies, phenolics and other resins, as well as synthetic fabrics and treated Teflon.

Adhesive can be used only where silicone rubber is vulcanized in place. Bond is formed while rubber is curing. Material is supplied as a solution composed of synthetic organic silicones in an ethanol solvent system. It contains no hydrocarbon solvents or oils. While material appears blue in solution, it is colorless when properly applied and dried.

### Physical Properties

Solids content, %	9.5 to 11.5
Sp gr (70°F)	0.83
Lb/gal	6.9
Flash pt, °F	<80

Shelf life is at least one year. Viscosity is equivalent to Gardner Bubble Viscometer Tube A-5. Although complete toxicity data have not been collected, denatured alcohol in solvent system suggests reasonable care should be exercised to prevent contact with skin and eyes, and to avoid prolonged or repeated breathing of vapor.

Material may be applied to clean metal or other substrates by spraying, dipping, brushing or any other convenient method which produces a thin adhesive layer.

(Adhesive EX-B579-1 is a product of Hughson Chemical Co., Div. of Lord Manufacturing Co., Erie, Pa.)

Check 1695 opposite last page.

**Molding compounds** of styrene, polyethylene, and vinyl chloride are discussed in 12-page booklet which includes detailed results of ASTM tests on these materials. "Plastics Fact File"—Department 1331, Monsanto Chemical Company, Springfield 2, Mass.

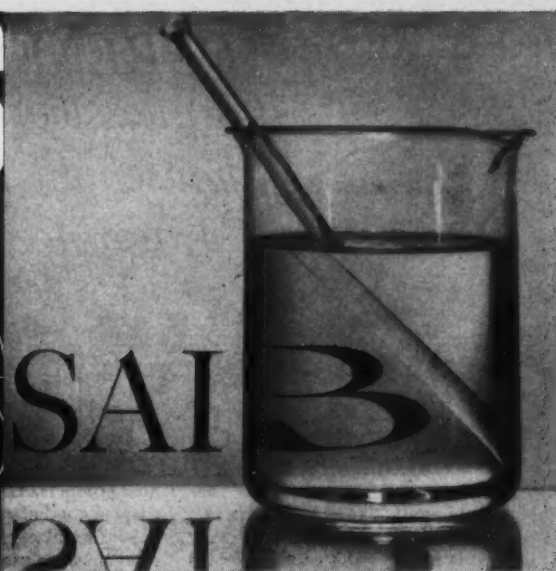
Check 1696 opposite last page.

# COLORLESS

at the start

# COLORLESS

in the finish



**Sucrose Acetate Isobutyrate, new resin modifier-extender, exhibits low color and excellent color stability**

**Sucrose Acetate IsoButyrate (SAIB)** is a most unusual compound of immediate interest to all who are concerned with the formulation or performance of plastic materials, lacquers, hot melts or other protective coatings.

Consider these characteristics:

Its color and clarity are a sparkling water-white.

Its color stability on exposure to ultraviolet light is excellent.

Its color stability on prolonged heating is excellent. Example: samples heat-aged 6 days @ 350°F showed only a 9 Gardner color change, from 1 to 10.

Its color stability in the presence of other lacquer ingredients is excellent. Example: in metallic pigmented lacquers, SAIB does not produce a "greening" effect with bronze powder.

Lacquer film formers highly modified with SAIB show unusually good film tensile properties and hardness. The low solution viscosity of SAIB permits formulation of *high-solids lacquers* at application viscosities. As a result, greater coverage per gallon of lacquer is achieved and solvent requirements are reduced. Formulating is simplified, too, through replacement of several lacquer-modifying components with SAIB. Film adhesion and permanence is improved in many cases.

To see how easy SAIB is to use, and how little it affects film properties while increasing solids content, add it to your present lacquer—try 5 to 10% by volume of total lacquer to start with—spray it, and observe the result.

In *hot melt-peelable plastic formulations*, SAIB greatly extends the basic film former. Serving as a solubilizer, it enables the formulator to use increasing

amounts of mineral oil. Because of SAIB's low volatility, there is no fuming of hot melts, even at temperatures up to 350°F. Modification with SAIB also lowers the operating temperature of hot melts.

Recent tests show its use with plasticizers improves the permanence and forming properties of *molding and extrusion compounds*, such as those based on cellulose acetate.

Few commercial compounds so high in molecular weight display so compact a structure. The outstanding stability characteristic of SAIB is attributed to this dense molecular configuration.

Another unusual property of SAIB is its extremely high viscosity at room temperature and sharp decrease in viscosity with the addition of heat or solvents. At 30°C, its viscosity is about 100,000 centipoises. At 100°C, the viscosity drops to 90 centipoises. Indicative of its solubility is the fact that a 90% solution of SAIB in Tecsol®, Eastman proprietary ethyl alcohol, exhibits a viscosity of only 750 centipoises at 30°C.

For convenience in formulating, SAIB is sold both as a 90% low-viscosity solution, designated *SAIB-90* and as a 100% concentrate, designated *SAIB*.

Many other applications for SAIB are being investigated by the Eastman Customer Service Laboratories. May we help you in evaluating this unique material in your product? For this service or for a sample of SAIB, write to Chemical Sales Development Department, Chemicals Division, Eastman Chemical Products, Inc., Kingsport, Tennessee, or contact the Eastman sales office nearest you.

# SAIB

SUCROSE ACETATE ISOBUTYRATE

**Eastman** CHEMICAL PRODUCTS, INC., KINGSPORT, TENNESSEE subsidiary of Eastman Kodak Company

Check 1697 opposite last page.



## ODRENES\* take the guesswork out of household product fragrance selection!

When you use an ODRENE to scent your household product you can be sure of a competitive selling advantage. For every ODRENE is consumer-tested and accepted as a pleasing modern fragrance. You take no chances on its appeal!

You can also be sure of its technical performance in your product. For ODRENES are scientifically compounded to solve the unique problems of house-

hold products. They are versatile, easily adapted to the special requirements of your formulae, stable, and extremely economical to use.

May we demonstrate how these fragrances can solve your odor problem? Write for samples and the full cooperation of our technical staff.

\*Odrene is the registered trade-mark for Sindar's series of fragrant additives.

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Industrial Aromatics and Chemicals

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Check 1698 opposite last page.

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151 North Avenue 19

Check 1699 opposite last page.

## CHEMICAL MATERIALS

A unique chemical compound, whose very existence was doubted in scientific circles until recently, is now available in development quantities. Sulfur tetrafluoride makes its bow as a . . .

## Reactive that

**Uses:** A reactive gas, sulfur tetrafluoride, has ability to replace oxygen in many organic, inorganic and organo-metallic compounds with fluorine. By means of this reagent, it is possible to prepare a wide range of selectively fluorinated products heretofore unavailable by practical routes.

**Features:** Sulfur tetrafluoride opens up a whole new range of selectively fluorinated products. It should be of particular interest in pharmaceutical products where addition of fluorine has been known to result in drugs of high potency. Ability of fluorine to cause or modify biological activity might also lead to better insecticides and herbicides.

Addition of fluorine could lend high thermal stability and oxidation resistance to finishes, films, plastics and elastomers.

**Description:** Although final product specifications for sulfur tetrafluoride (technical) have not been established, this is a typical composition of material now available:

Purity, %	90-94
Thionyl Fluoride, % (SOF <sub>2</sub> , bp -44°C)	5-9
Chlorine, % max	0.3

Following physical property data have been obtained on purified SF<sub>4</sub>:

Molecular Wt	108.06
Appearance	Colorless gas
Odor	Resembles SO <sub>2</sub>
Melting Pt, °C	-121 ± 0.5

### Typical Chemical Reactions

An outstanding property of sulfur tetrafluoride is its ability to replace carbonyl oxygen in organic compounds with fluorine:



Reaction has broad scope and is effective with a variety of carbonyl compounds including aldehydes, ketones and carboxylic acids. In reaction of SF<sub>4</sub> with a carboxylic acid, the carboxylic group is converted to a trifluoromethyl group:



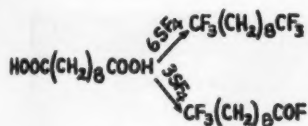
This is most general and one of the most direct methods of synthesizing compounds containing trifluoromethyl groups.

With polybasic acids, degree of fluorination can be con-

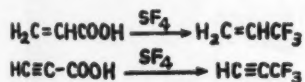


## fluorinating agent widens product horizons

trolled by molar ratio of  $SF_4$  which is employed:



Olefinic and acetylenic bonds are generally unaffected, thus making available a series of trifluoromethyl-substituted olefins and acetylenes:



Other functional groups, for example, fluoro, chloro, bromo, nitro and methoxycarbonyl in aromatic compounds are not affected by  $SF_4$  at moderate temperatures.

Sulfur tetrafluoride reacts readily with isocyanates, nitriles and azomethines to yield an unusual class of compounds, the organoiminosulfur difluorides. These reactive chemicals may be used as polymerization initiators. They can be readily converted to stable derivatives.

Sulfur tetrafluoride is a reactive gas which exhibits a high order of toxicity. In acute inhalation toxicity tests at Du Pont Haskell Laboratory for Toxicology and Industrial Medicine, it was found that a four-hour exposure to an analytical concentration of 19.4 ppm was lethal to one of two animals exposed.

Since  $SF_4$  liberates hydrofluoric acid on exposure to water, care must be taken to avoid HF burns when this material is used. Release of gas into atmosphere generates a fog or mist of hydrofluoric acid by reaction of  $SF_4$  with moisture in the air. Reaction mixtures in which  $SF_4$  has been employed usually contain hydrofluoric acid.

Developmental quantities of  $SF_4$  are available. It is packaged as a liquefied gas in steel cylinders. It can be stored in stainless steel cylinders or in ordinary steel cylinders with brass fittings.

(Sulfur tetrafluoride is a product of Organic Chemicals Dept., Dyes & Chemicals Div., E. I. du Pont de Nemours & Company, Inc., Wilmington 98, Delaware.)

Check 1700 opposite last page,

For Coconut Oil Fatty Acids or Methyl Esters, remember...

OA 419 FOREMOST EL DORADO  
7/1/59 458 PM GA PLS

THIS IS ST LOUIS XYZ URGENT  
NEED TANKCAR METHYL LAURATE 96  
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SOONER IF POSSIBLE

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Four days and 2400 miles later in St. Louis, an anxious Foremost customer will relax. This same tank car

will roll to his siding, the seal on the dome will be broken and 8000 gallons of Methyl Laurate will be ready for use... a full day ahead of schedule.

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*Even faster deliveries are available from Eastern and Mid-Western shipping points. Contact the agent nearest you or write for samples and specifications. Department B-2*

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Myristic Palmitic  
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#### METHYL ESTERS

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Laurate Myristate Palmitate  
Oleate Eldo\*18 Coconate

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Check 1701 opposite last page

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Check 1702 opposite last page.

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Check 1703 opposite last page.

## CHEMICAL MATERIALS

**Low temp flexibility  
given plastics by  
alkylated fat**

Product keeps PVC pliable  
at -30 to -50°F

Uses: Product was developed to give lasting low-temperature flexibility to plastics.

Features: Plastics containing this plasticizer will bend without breaking at temperatures as low as -50°. Added to PVC at about 35% by weight, it kept material soft and flexible even when exposed to temperatures of -30 to -50°F.

Description: Plasticizers, dialkylphosphonostearates, are phosphorus-containing compounds made from inedible animal fats. They are produced by reacting a mixture of dialkylphosphonate and fatty esters. Since they escaped from plastic base at a slower rate than conventionally available materials, they increase flexibility life of plastic end product.

(Dialkylphosphonostearates were developed by the Agricultural Research Service, United States Department of Agriculture, Washington, D.C.)

**Easy regeneration  
marks catalyst,  
no corrosion**

Highly selective activity offered by product

Uses: Catalysts are generally used in reactions that are otherwise catalyzed with hydrogen acids.

Features: Montmorillonite catalysts have virtually no corrosive action and are easily regenerated. They exhibit highly selective catalytic activity.

Description: These K-series catalysts are produced from clay-mineral montmorillonite, an aluminum hydrosilicate. Among types available are K-306 supplied in powder, granulated or globular form for depolymerization and splitting of long-chained hydrocarbons; K-10, available in same forms, for alkylation, dehydration,

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Check 1704 opposite last page.

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Specialists in metering pumps and lubricators since 1898

Check 1705 opposite last page.

CHEMICAL PROCESSING

## CHEMICAL MATERIALS

isomerization and polymerization; and KSF, KSFO and K-10-SF also available in all three forms for more severe alkylation and isomerization. Catalysts are development of Sud-Chemie, AG., Munich, Germany.

(Montmorillonite catalysts are available from Girdler Catalysts, Chemical Products Div., Chemetron Corporation, Louisville, Ky.)

Check 1706 opposite last page.

### Producing commercially 24 new fatty nitrogens

Now commercially available are 24 chemical intermediates including four primary, five secondary, and three tertiary fatty amines; four fatty trimethyl ammonium chlorides; five difatty dimethyl ammonium chlorides; a trifatty methyl ammonium chloride; and two quaternized fatty diamines.

Solubility in wide variety of polar and non-polar solvents, surface activity, base exchange, and anti-static activity are among properties possessed by products.

(Fatty nitrogens are being produced by Chemical Division, General Mills, Kankakee, Illinois.)

Check 1707 opposite last page.



"I don't care. She's the best blender we've ever had!"

# New Vinyl-Acrylic

## COPOLYMER SOLUTION



Another example of original resin research at National's Plainfield, N. J. laboratories. Built in 1952. Doubled in 1955. Expanded in 1957. With major expansion now in planning.

## FOR FLEXIBLE AND PRESSURE SENSITIVE ADHESIVE COATINGS

A new, unique copolymer solution. Ideal for flexible film laminations and pressure sensitive adhesive formulations. Exhibits specific adhesion to most cellulosic and synthetic surfaces.

Application possibilities for this tacky, flexible film former are many. In laminations of "Mylar" polyester film, cellophane, nylon, polyethylene, saran, paper, foil. In packaging adhesives. In pressure sen-

\*Du Pont's reg. trademark.

sitive and specialty adhesives. In printing inks.

This new base is noncorrosive. Exhibits excellent heat and light stability. It can be used as is or modified to accentuate specific characteristics. Technical data and information on compatibility with other film formers, resins, tackifiers and solvents are available. Just contact your nearest National office asking for our New Product Bulletin on Resyn® 26-2404.

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Check 1708 opposite last page.



## Don't spoil it. KROIL it!

Don't ruin a valuable piece of equipment merely because some part is rusted tight. Apply KROIL, the amazing new chemical lubricant that creeps into millionth inch spaces (proved by laboratory tests), dissolves rust, supplies necessary lubrication and . . .

### Loosens Frozen Parts

18,000 of America's leading plants can't be wrong. They have used KROIL for ten years and depend on it to save expensive labor and valuable parts. They say: "Kroil loosened bushings after a 12-ton press had failed" . . . "on repairing heat treat trolleys formerly destroyed every nut. Now Kroil saves them all, and time, too."

You too can get these results. Try KROIL on money-back basis. Gallon, \$4.00; with Kroiler squirt gun, \$4.95, f. o. b. factory.

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Check 1709 opposite last page.

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## CHEMICAL MATERIALS

**This styrene-acrylate copolymer combines clarity, toughness**

Product developed primarily for floor waxes

**Uses:** Copolymer emulsion was developed primarily for floor wax industry.

**Features:** Because of high gloss developed by formulations using this emulsion, polishes can be compounded at lower solids. It is completely compatible with common waxes, resins and polymers, and can be formulated into a non-powdering floor polish.

**Description:** Styrene-acrylate copolymer emulsion combines features of acrylic and polystyrene emulsions. It brings together flexibility and clarity of an acrylate with gloss and toughness of a styrene. Product is priced in same range as modified polystyrenes.

(U-4001 Ubatol styrene-acrylate copolymer emulsion is a product of UBS Chemical Corporation, 491 Main St., Cambridge 42, Mass.)

Check 1710 opposite last page.

**Six titanium organics now are available in commercial quantities**

Products hold promise for inorganic coatings

**Uses:** Organic titanium compounds should be useful in manufacture of industrial adhesives, water repellents and resins. In addition to these intermediate uses, compounds can act as adhesion promoters and pigment dispersants.

**Features:** Distinguished by high chemical reactivity, particularly with water and hydroxy compounds, these titanium esters hold promise in producing inorganic coatings which are adherent to most surfaces. Coatings are resistant to temperatures as high as 500°C.

**Description:** Commercial quantities of six organic compounds have been made available. Products include four

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- All Other Low Temps.

You can accurately read any low surface temperature with the Alnor Type 2300 Surface Pyrometer—in 3 to 5 seconds.

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4800 South Richmond Street  
Chicago 32, Illinois



Check 1712 opposite last page.

CHEMICAL PROCESSING

## CHEMICAL MATERIALS

ortho esters and two of the more stable chelates of titanium. They are:

tetraisopropyl titanate  
tetrabutyl titanate  
tetrakis (2-ethylhexyl) titanate  
tetraoctylene glycol titanate  
triethanolamine titanate ester  
tetrastearyl titanate

The latter compound is a solid while all others are liquids, with prices varying upward from about \$1 per pound.

Polymers containing hydroxyl groups, such as polyvinyl alcohol, epoxy resins, cellulose and alkyds, can be cross-linked with titanium organics. Tetraisopropyl and tetrabutyl titanates in particular react very rapidly with hydroxyl-containing resins to produce cross-linked polymers. Applied as a top coat to nitrocellulose, epoxy resins and some alkyds, titanium esters give instant insolubilization and drying.

Chelated titanium esters such as octylene glycol titanate and triethylene glycol titanate are less reactive than the regular esters, and give more controllable cross linking. Temperatures of 80 to 120°C will induce reaction of titanate with resin after coating has been applied.

(Organic titanium compounds are product of Dyes and Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.)

Check 1713 opposite last page.

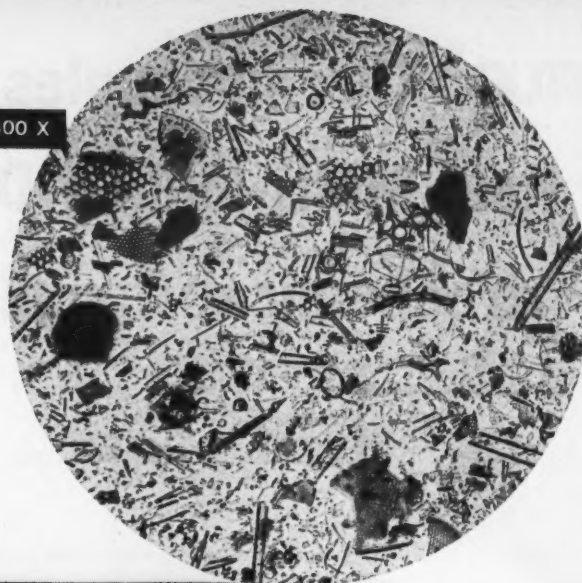
### End fertilizer odor by masking it

Line of odorants developed by manufacturer is especially designed for masking and re-scenting of fertilizer products. Company invites fertilizer manufacturers to submit a sample of product. Sample will be tested and appropriate masking odor submitted for evaluation.

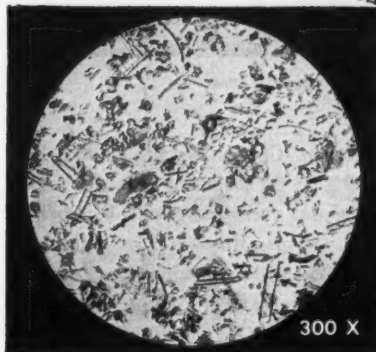
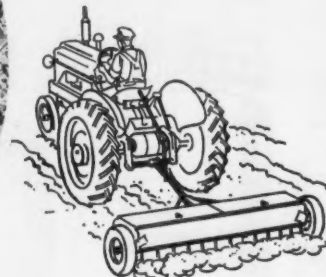
(Fertomask odorants are products of Dodge & Olcott, Inc., 180 Varick St., New York 14, New York.)

Check 1714 opposite last page.

300 X

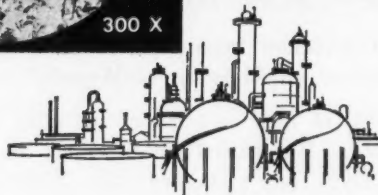


For fertilizer coating—Celite 379, a natural milled diatomite, provides the uniform conditioning needed to prevent caking of granular, mixed or prilled fertilizers—maintains good free-flow characteristics even after prolonged storage.



300 X

For catalyst carriers—Super Floos, finest particle size flux-calcined Celite grade, is used where a non-reactive porous silica support is needed. (Also available: special Celite supports in many preformed shapes for strength, high temperature stability, resistance to abrasion and attrition.)



As a paint-flattening agent—Celite 281, air-floated fines of flux-calcined diatomite, provides uniform and efficient flattening at low cost. Contributes to control of low angular sheen, durability, and faster drying.



300 X

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## Celite diatomite absorbs its own weight of liquid... yet stays 'dry'

No matter which of the many available grades you choose, you can depend on a given volume of inert Celite\* to retain its typical dry-powder characteristics even after absorbing its own weight of liquid.

Actually, Celite can absorb a total of more than twice its own weight. That's because a mass of the fine skeletal particles is approximately

93% air space or voids. Yet, in spite of this very high porosity, Celite is essentially non-hygroscopic.

Other unique properties—extremely high bulk, irregular particle shape and large available surface area—ideally suit Celite to hundreds of mineral filler applications. It is produced with precision from the world's purest commercially available dia-

tomite deposit. It offers a wide choice of grades, each carefully controlled for complete uniformity.

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\*Celite is Johns-Manville's registered trademark for its diatomaceous silica products

# JOHNS-MANVILLE

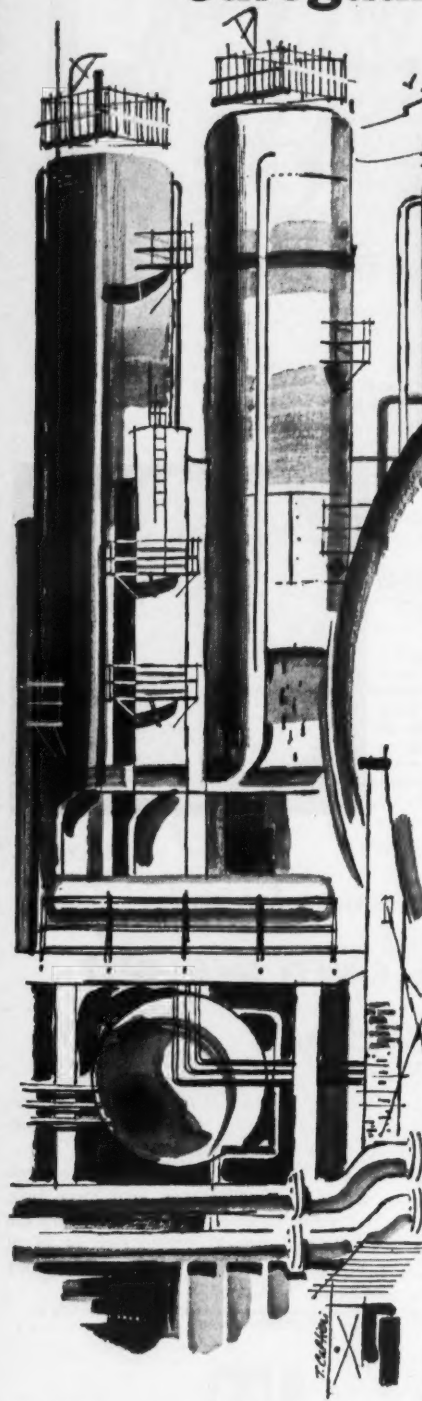


Check 1715 opposite last page.



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At the Lake Charles, La. plant of Petroleum Chemicals, Inc., controlling temperatures from 300° below zero to over 2000° F. is critical. Thermocouples installed throughout the plant must withstand corrosive atmospheres, high pressures, and high velocity gas streams. Despite this "rough treatment", these thermocouples must be long-lived to cut costly down-time. They must be accurate and sensitive to eliminate the possibility of malfunction.

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To assure protection of their installation—including the world's largest ammonia plant reactor, Petroleum Chemicals, Inc., chose Thermo Electric "CERAMO-COUPLES". They particularly like "CERAMO" because they have been able to depend on the inherent superiority of the ceramic insulated, metal sheathed thermocouple wire, for long in-service life, and continuous accuracy.

"CERAMO", introduced by Thermo Electric in 1951, is now recognized as an industrial standard for temperature sensing elements . . . many thousands of "CERAMO" thermocouples are being used in installations throughout the world.

Years of specialization in the design and manufacture of "CERAMO" thermocouples enable us to offer a product of consistently high quality. Our experience with thousands of specific applications has given us a vast knowledge of the product's proper use in industry.

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Check 1716 opposite last page.

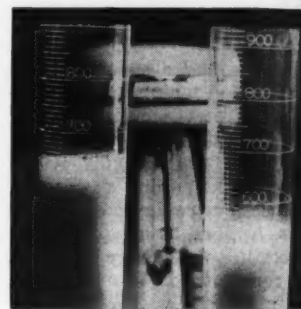
### CHEMICAL MATERIALS

**Pigmented paper coatings boosted in strength by latex**

Low foaming properties aid processing

Uses: Preparation of pigmented coatings for paper.

Features: Latex is reported to have as much as 50% increased film strength which results in better pigment binding and increased pick



Comparison of conventional latex (left) and low-foaming latex after violent agitation

resistance of coated sheet. Foaming tendencies are decreased and minimal foam dissipates at rapid rate.

**Description:** Product is styrene-butadiene latex and has a carefully adjusted emulsifier content. It is compatible with various clays and pigments as well as with starch and casein. Although still in developmental stage, latex is available in commercial quantities.

(Dylex latex KCD-154 is product of Plastics Division, Koppers Company, Inc., 801 Koppers Building, Pittsburgh 19, Pennsylvania.)

Check 1717 opposite last page.

**Fresh leafy odor added to perfumer's palette by synthetic ketone**

Recent development in field of perfume chemistry adds Nerone, a synthetic ketone, to list of synthetic fragrances available. Aromatic chemical has a fresh, leafy odor resembling petitgrain oil. It is exceptionally stable and strong in soaps and detergents. Col-

### CHEMICAL PROCESSING



orless to slightly yellow liquid is a menthenyl ketone which supplies synthetically odor effect of exotic ketone portion of essential oils which as a class of ingredients has been largely unavailable to the perfumer.

(Nerone is a product of Gi-vaudan-Delawanna, Inc., 321 W. 44th St., New York 36, New York.)

Check 1718 opposite last page.

#### Liquid prepolymer for urethane rigid foams

Resulting product has low thermal conductivity

**Uses:** Product is designed for use in production of rigid foams with high strength-to-weight ratios and low thermal conductivity properties.

**Features:** High strength-to-weight ratios and low thermal conductivity properties are combined with a high percentage of closed cells and good adhesive characteristics.

**Description:** Liquid urethane resin prepolymer is formulated with halogenated hydrocarbon such as Freon. Low viscosity catalyst systems facilitate mixing and pouring in both manual batch or automatic metering operations.

#### Typical Properties

Color	Light	Amber
Sp gr (25°C)		1.207
Viscosity, poises		
80°F		27.7
100°F		9.4
120		4.8
160		1.3

Halogenated hydrocarbon is either incorporated in pre-polymer package or added at point of application, according to customer preference.

(Rigithane 334 foaming resin is a product of Thiokol Chemical Corporation, 780 N. Clinton Ave., Trenton 7, N. J.)

Check 1719 opposite last page.

Dry colors' technical data and suggested uses are contained in four-page revised bulletin. Bul 02-175-54-59—Harwick Standard Chemical Co., 60 South Seiberling St., Akron 5, Ohio.

Check 1720 opposite last page.

High  
Reactivity

More  
Soluble  
Reaction  
Products

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When you start with a more reactive material like Solvay® Caustic Potash, you usually get better results. Many users prefer it to caustic soda because it enables them to produce more soluble reaction products and less viscous solutions.

For example, its high solubility permits liquid end products having high soap concentration. Many heavy-duty liquid detergents would not exist were it not for ingredients derived from caustic potash.

Its high reactivity is also useful in mercaptan extraction and desulfurization of petroleum products. Caustic potash solutions effectively absorb carbon dioxide and hydrogen sulfide in industrial gases. Dry forms are highly hygroscopic, excellent for dehydration.

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Potassium Carbonate • Sodium Bicarbonate • Chloroform • Methyl Chloride  
Soda Ash • Vinyl Chloride • Ammonium Chloride • Methylene Chloride • Carbon  
Tetrachloride • Snowflake® Crystals • Monochlorobenzene • Ortho-dichlorobenzene  
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Samples of Mercury Cell Caustic Potash

☐ Flake ☐ Liquid, 45% strength  
☐ New Technical Bulletin 15, Caustic Potash

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Check 1721 opposite last page.

**FOR YEARS OF PIPE ECONOMY...**

**THIS  
EXTRUDED  
HEAVY  
WALL**

**PROTECTS**  
against severest heat,  
pressure and corrosion

Proven in nuclear installations, CURMET high integrity tubing is ideal for the toughest applications in the petro-chemical, petroleum and chemical industries. This tubing from the Metals Processing Division of Curtiss-Wright is extruded in stainless steel and other ferrous alloys in lengths up to 45 feet or more. It provides increased on-the-job life, long term economy based on optimum physical properties—not just for months, but for years to come.

Curtiss-Wright tubing is extruded to specification by the 12,000 ton horizontal steel extrusion press. This process provides uniform high strength and high resistance to pressure, heat and corrosion. Write today for information on both your standard and special requirements.

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**CURTISS-WRIGHT**  
CORPORATION

75 GRIDER STREET



**METALS PROCESSING**  
DIVISION  
BUFFALO 15, NEW YORK

Check 1722 opposite last page.

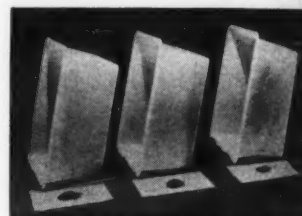
## CHEMICAL MATERIALS

***Eliminate dust attraction  
in molded articles  
of polyethylene***

Products retain toughness  
and rigidity

**Uses:** Molding conventional polyethylene products with built-in resistance to dust attraction.

**Features:** Polyethylene compounds do not retain electrical charge and therefore finished products will not attract dust.



Lack of dust attraction is demonstrated by two polyethylene molded pieces fabricated from anti-dust resin (left). Conventional resin part is on right

**Description:** Resins possess all desirable properties of high-quality polyethylene including low-temperature toughness and improved rigidity. Two forms are available, DNDA-0401 a high-flow, general-purpose material with less rigidity than DPD-7366.

(DNDA-0401 and DPD-7366 polyethylene resins are products of Union Carbide Plastics Company, Div. of Union Carbide Corporation, 420 Lexington Ave., New York 17, New York.)

Check 1723 opposite last page.

***Ozone protection offered  
rubber materials by  
deep-purple solid***

Material works under static  
and dynamic conditions

**Uses:** Protecting rubber goods against ozone attack and flex cracking.

**Features:** Product is effective in both static and dynamic conditions for either synthetic or natural rubber. Typical formulation for dy-

## CHEMICAL PROCESSING



# U.S.I. CHEMICAL NEWS

★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★

## Sodium Alcoholates Act as Catalysts for Formation of Graft Polymers by Milling

Government researchers reported recently that graft polymers can be prepared by milling the component resins together on an ordinary roll mill with an anionic catalyst such as a sodium alcoholate. The reactants need not be solubilized, since reaction takes place right on the mill.

So far, styrene has been grafted onto polybutadiene and onto a copolymer of butadiene and acrylonitrile by this process. In a typical preparation, polybutadiene is milled with dispersed sodium until the mixture reaches 60°C. After cooling the rolls to 20°C, styrene is added, then propinol. Cooling stops and polymerization begins.

Temperature control is of the greatest importance to the success of the reaction. Too much heat causes gel formation; too little yields polystyrene. The researchers report that stabilizers need not be removed from the resins since they do not interfere with the grafting process. Resins can therefore be stored until used. No inert atmosphere is necessary.

Information on the preparation of sodium dispersions and their use as polymerization catalysts generally, as well as their use for sodium alcoholate preparation, is contained in U.S.I.'s brochure on Sodium Dispersions. This brochure may be obtained on request.

## n-Butyl Alcohol Data Sheet Just Issued by U.S.I.

n-Butyl alcohol—solvent for coatings and resins and intermediate for plasticizers, resins, weed killers, ore flotation agents and many other compounds—is described in a new technical data sheet now available from U.S.I.

Specifications, properties, shipping and application information are included. The advantages of the material as a solvent for nitrocellulose lacquers are highlighted.

The data sheet can be obtained from U.S.I. sales offices or from the Industrial Alcohol and Solvents Sales Department at 99 Park Avenue in New York.

## Ether Aerosol Gives Diesels Quick Start

Ethyl ether and a lubricant have been combined in an aerosol formulation designed to permit quick starting of diesel engines in cold weather.

The formulation, recently put on the market in pressurized cans, is said to be low in cost and to perform at temperatures down to minus 60°F. Advantages cited for this priming fuel include: reduced dilution and wear, minimizing of strain on engine parts and batteries, prevention of downtime, elimination of towing and extra labor costs.

## New Uses Developing Rapidly For Polyethylene Film in Chemical Plant Construction

**Film Makes Ideal Moisture Barrier for Buildings and Roads; Protects Construction Machinery, Equipment and Materials.**

The ready availability of low-cost polyethylene film in a wide range of widths, lengths and thicknesses is changing the face of the construction industry. New building practices and techniques are evolving rapidly to take advantage of the

### New Analysis for Naphthas Uses Gas Chromatography

At the ACS meeting at Atlantic City in September, it was reported that a shortened analysis for olefin-free naphthas has been developed. Gas chromatographic methods, using ethyl chloride as an internal standard, is said to give the content of C<sub>3</sub> and lighter components in these naphthas in one-third the time formerly required by standard low-temperature fractional distillation (LTFD) methods.

The naphtha sample, blended with ethyl chloride, is injected onto Silicone 200 on a column of Celite. The technique involves reversing the flow of the helium carrier gas after n-pentane has come off, to backflush the heavier components from the column.

In addition to the time-saving aspects of the new method, it is claimed to give outstanding reproducibility as well as improved accuracy over the LTFD method.

excellent moisture barrier characteristics, strength and light weight of the material.

Another great advantage in construction work is the durability of polyethylene film. It has great toughness and elasticity and will take considerable abuse without tearing. It stays flexible under all types of weather conditions.

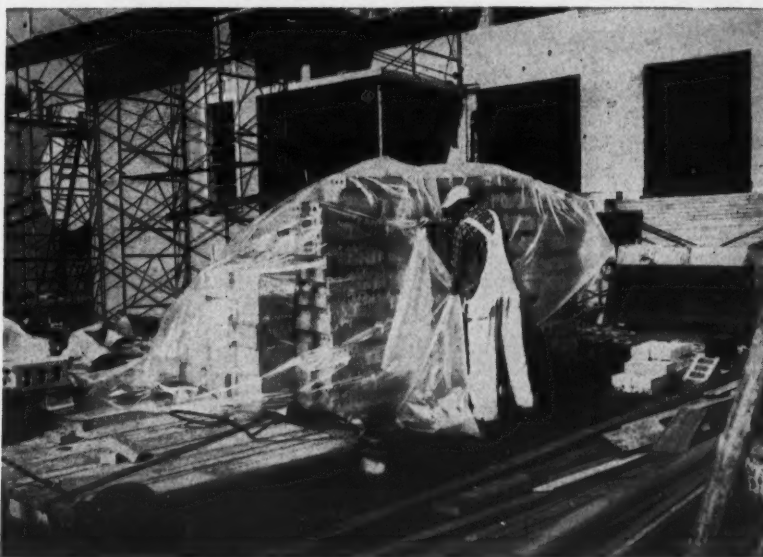
### Film Valuable in Concrete Work

Constructors of chemical plants, commercial buildings, homes and other structures are employing polyethylene film for three general types of jobs: in concrete work; as a vapor barrier for interiors; as a protective covering.

As a curing agent for concrete slabs, polyethylene film laid over the watered, hardened concrete retards evaporation and allows the slab to age slowly, giving maximum hardness. The sheet can then be used again, either for the same type of job, or under a foundation slab or concrete road section as a moisture barrier base.

Because of its flexibility, strength and light weight, polyethylene film has proved

**MORE**



Polyethylene tarpaulin being placed over building materials during plant construction.



# U.S.I. CHEMICAL NEWS

## CONTINUED

### Polyethylene Film

easy to handle in concrete work, and cuts down on tearing, which has been a problem with many other materials.

#### New Use in Tilt-Up Construction

In tilt-up slab concrete construction, polyethylene film is being used as a bond-breaking barrier. A layer of film is laid on the surface on which the slab will be poured, to separate it from that surface. After drying, the poured slab can be tilted up from the surface quickly and easily. Its undersurface is smooth, and it has received a strong, even cure because of the moisture barrier characteristics of the film.

In the pouring of foundation walls, polyethylene film is being employed to line the forms for smooth finish and better curing. It is then attached to the walls before backfilling, to act as a moisture barrier for the completed foundation.

Polyethylene film acts as an excellent moisture barrier on side walls and ceilings, in the water-proofing of beams, in the flashing of stone and brick sills, for flashing window and door heads in masonry construction—in short, for all types of moisture-proofing work on buildings.

#### Film Protects Work and Personnel

Finally, chemical constructors find that polyethylene film gives excellent protection from the weather—for men, structures, equipment, machinery and materials. On unfinished buildings, it keeps out wind and dirt while permitting the sun's light and heat to enter. Work can continue, uninterrupted by cold or storm. And as a tarpaulin, polyethylene film is light and easy to handle—provides the most inexpensive protection available for expensive equipment.

The future of polyethylene in the building industry continues to be brightened by new applications. For example, "bubble houses" held up by air pressure show promise as economical shelters for construction work or temporary storage. New uses such as these promise to further the spectacular growth which has been characteristic of polyethylene in recent years.

### Another New UV Absorber Developed for Polyethylene

A metal-organic stabilizer has been developed to protect polyethylene film, sheet and monofilaments against deterioration from ultraviolet action during outdoor exposure. It is claimed that a two- to five-fold increase in the useful life of the finished product can be obtained through incorporation of this stabilizer into the resin.

The compatibility of the product with polyethylene and its high thermal stability are said to make it suitable for low-gauge films where, because of the high ratio of surface area to volume, conventional UV absorbers are not too effective.

As little as 0.25% of the product has been found to give effective stabilization. However, 0.5% is generally recommended. At these concentrations, the very slight green color imparted is reported to be negligible, particularly in low-gauge stock. The material is also recommended for use with polyolefins other than polyethylene.

The following typical weathering data is given for conventional polyethylene:

Percent Elongation Versus Hours of Accelerated Weathering\*

Stabilizer Concentration, %	Hours of Exposure		
	0	150	250
0.0 (unmilled sample)	545	105	26
0.0 (milled sample)**	388	86	0
0.2 (milled sample)**	400	366	175
0.5 (milled sample)**	262	247	252

\* Accelerated weathering conducted in Fade-O-Meter. Five-mil, extruded film used for tests.

\*\* Standard procedure includes 10-minute milling of resin and additive, at or near melt temperature of respective resins, on 2-roll plastics mill, to insure complete dispersion.

## TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

**New, all-inorganic zinc coating** is designed to give high galvanic protection and to eliminate sub-film rusting in fresh and salt water, solvents. Claimed effective from  $-80^{\circ}\text{F}$  to  $+750^{\circ}\text{F}$ . Can be used as single coat or as prime coat. **No. 1520**

**Handbook on properties of rare earth metals and compounds** is now being sold. Brings together for first time current data on physical, crystal, chemical, mechanical, electrical, magnetic, nuclear and thermodynamic properties of the 15 rare earth metals plus yttrium. **No. 1521**

**Electron beam welding process** has been developed for zirconium, hafnium and tantalum and other reactive metals impossible or very difficult to weld by ordinary means. Uses high intensity beam in high vacuum. **No. 1522**

**Fact file on titanium and titanium alloys** can now be obtained. Booklet contains sections on high temperature performance, corrosion and erosion resistance, properties, metallurgy, machining, fabrication, welding and testing. **No. 1523**

**New use for molecular sieves**—to both store and tame a large number of chemical compounds which are extremely volatile, toxic or reactive—is described in a booklet now available on chemical-loaded molecular sieves. **No. 1524**

**Phospho and silico molybdc acids** are now being produced in experimental quantities. Suggested for use in analyses and in petrochemical and pigment fields, as catalysts, organic precipitants and corrosion inhibitors. **No. 1525**

**An atomic industry directory** of products, equipment and services can now be purchased. Gives product and service profiles of over 200 industrial organizations active in development and use of atomic energy here and abroad. **No. 1526**

**Colorimetric unit** for quick-testing of low concentrations of dissolved oxygen in boiler feed-water is now on market. Claimed accurate to within two parts per billion of oxygen. Said to be easy to use by inexperienced operators. **No. 1527**

**Tetranitromethane oxidizer** for high-energy liquid and solid rocket and missile fuel systems is described in new data sheet. Active oxygen content is close to liquid oxygen while formulation of stable, storable fuels is easier. **No. 1528**

**New pH calculator**, set up like a slide rule, solves complex problems involving concentration of buffer solutions, rapidly and easily. Eliminates logarithm calculations with scales that can be read to second decimal place. **No. 1529**

## PRODUCTS OF U.S.I.

### POLYETHYLENE RESINS

#### PETROTHENE® Polyethylene Resins

Top grade resins for film extrusion, paper coating, electrical wire and cable coating, calendering, injection molding, blow molding and thermoforming.

### CHEMICALS

**Organic Solvents and Intermediates:** Normal Butyl Alcohol, Amyl Alcohol, Fusel Oil, Ethyl Acetate, Normal Butyl Acetate, Diethyl Carbonate, DIATOL®, Diethyl Oxalate, Ethyl Ether, Acetone, Acetoacetanilide, Acetoacet-Ortho-Chloranilide, Acetoacet-Ortho-Toluidide, Ethyl Acetoacetate, Ethyl Benzoylacetate, Ethyl Chloroformate, Ethylene, Ethyl

Sodium Oxalacetate, Sodium Ethylate, Urethan U.S.P. (Ethyl Carbamate), Riboflavin U.S.P.

**Pharmaceutical Products:** DL-Methionine, N-Acetyl-DL-Methionine, Urethan USP, Intermediates.

**Heavy Chemicals:** Anhydrous Ammonia, Ammonium Nitrate, Nitric Acid, Nitrogen Fertilizer Solutions, Phosphatic Fertilizer Solution, Sulfuric Acid, Caustic Soda, Chlorine, Metallic Sodium, Sodium Peroxide.

**Alcohols:** Ethyl (pure and all denatured formulas); Anhydrous and Regular Proprietary Denatured Alcohol Solvents SOLOX®, FILMEX®, ANSOL® M, ANSOL® PR.

**Animal Feed Products:** Antibiotic Feed Supplements, Calcium Pantothanate, Choline Chloride, Special Liquid CURBAY, Menadione (Vitamin K<sub>3</sub>), DL-Methionine, MOREA® Premix, Riboflavin Products, U.S.I. Permadry, Vitamin B<sub>12</sub> Feed Supplements, Vitamin D<sub>3</sub>.

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**INDUSTRIAL CHEMICALS CO.**

Division of National Distillers and Chemical Corporation  
99 Park Avenue, New York 16, N. Y.

namic application is 1.5 parts per 100 parts polymer, without additional antioxidant or flex-cracking chemical.

**Description:** Deep purple solid has a minimum crystallizing point of 70°F. Designated Nonox ZA, product chemically is p-isopropylaminodiphenylamine. It is currently being marketed as a dustless flake that disperses readily in mill or Banbury.

Antiozonant stains and therefore is not recommended for light stocks or for application where there is a possibility of migration to light-colored materials. Concentrations as high as 4% may be used in synthetic rubber. In natural stocks some bloom may appear at 2.5-3.0 parts per 100 parts rubber.

(Nonox ZA is available from Harwick Standard Chemical Co., 60 S. Seiberling St., Akron, Ohio.)

Check 1724 opposite last page.

**Latex resin compatible  
with zinc oxide  
in paints**

Material extends stability of exterior latex paints

**Uses:** Product permits utilization of zinc oxide in both white and tinted interior and exterior latex paints.

**Features:** Resin offers packaged stability, until now a problem area when combining zinc oxide with latex formulations.

**Description:** Designated Resyn 25-2243, latex is a polyvinyl-acrylic copolymer. Product was developed and evaluated jointly by manufacturer and Pigments Committee of American Zinc Institute, Inc.

(Resyn 25-2243 is a product of National Starch and Chemical Corporation, 750 Third Ave., New York 17, N. Y.)

Check 1725 opposite last page.

For more information on product at left, specify 1726 . . . see information request blank opposite last page.



## Clarity control is almost this easy with DICALITE Filteraids

**FIRST REASON** is, of course, that Dicalite supplies the greatest variety of filteraids to handle practically every type of fluid . . . a complete family of top-quality diatomite filteraids of different performance characteristics, plus Nerofil carbon-based filteraids and other special filteraids developed and processed for particular applications.

**SECOND REASON** is that Dicalite makes expert technical service freely available to help you match a Dicalite Filteraid to your particular problem, so that you'll get maximum production joined with greatest economy.

**THIRD REASON** is the ability of Dicalite Filteraids to handle the all-too-common variations in the filterability of process liquors — usually by the simple method of varying the filteraid dosage to meet the requirements of the 'tough' run. This is one of the criteria of a quality filteraid . . . and Dicalite Filteraids, all of them, are recognized as being without a superior.



*...give you critical control of clarity*

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Check 1727 opposite last page.

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Special Report:

## FILTRATION THROUGH REPLACEABLE CARTRIDGES



COMMERCIAL FILTERS CORPORATION

**BOOTH  
223**

This important new technical bulletin contains comprehensive data on the use of replaceable filter cartridges in the micro-clarification of liquid chemicals, petro-chemicals, pharmaceuticals, oils, liquid fuels, water, compressed air and other gases.

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**COMMERCIAL FILTERS CORPORATION**  
MELROSE, MASSACHUSETTS

Get your personal copy at the Commercial Filters Corporation BOOTH (223), 27th Exposition of Chemical Industries, from November 30th through December 4th. Various types of cartridges and filters will be demonstrated.

Check 1728 opposite last page.

### CHEMICAL MATERIALS

**Adhesion to paper greater in three polyethylene coating resins**

Can be extruded on variety of substrates

**Uses:** Resins can be used to coat a variety of substrates including paper, paperboard, foil, cellophane and others.

**Features:** Resins display marked improvement in adhesion and draw-down characteristics as well as reduction in neck-in, smoking, coating temperatures and polymer build-up at the die.

**Description:** Three polyethylene resins are available each with a density of 0.915: 200-2 has a melt index of 3.0, recommended coating weight is 20 lb/3000 sq ft and higher; 201-2 has a recommended coating weight of 10 to 25 lb/3000 sq ft, with a melt index of 5.0; 203-2 shows a melt index of 8.0 and a recommended coating weight of 3 to 15 lb/3000 sq ft.

(Petrothene paper-coating resins are product of U.S. Industrial Chemicals Co., Div. of National Distillers and Chemical Corporation, 99 Park Ave., New York 16, N.Y.)

Check 1729 opposite last page.

**Laminating resin cured in 2-3 hr at 250°F**

**Uses:** Laminating of glass fibers, and potting and encapsulating electrical components.

**Features:** Long pot life (three days at 75-80°F) and good impregnating qualities. Material cures in two to three hours at 250°F or one hour at 300°F.

**Description:** Epoxy laminating resin is prepared by pre-heating resin to 120-150°F, and then adding hardener. This lowers fluidity, making system adequate for impregnation. Resin and hardener are combined in equal parts by weight.

(Epocast 28 is development of Furane Plastics, Incorporated, 4516 Brazil St., Los Angeles, California.)

Check 1730 opposite last page.

CHEMICAL PROCESSING



**N-butyllithium produced**

... at initial rate of 1000 lb/month in Minneapolis, Minn., production facility. Chemical is used in manufacture of synthetic rubber polymers such as polyisoprene and polybutadiene. It is also employed as pharmaceutical intermediate.

Reaction of lithium metal and butyl chloride is utilized in manufacturing process which has been modified technologically to provide for future expansion.

(N-butyllithium is being manufactured by Lithium Corporation of America, Inc., 1100 Title Insurance Bldg., Minneapolis, Minn.)

Check 1731 opposite last page.

**Dust problem eliminated with liquid paper dye**

Uses: Liquid dye for paper.

Features: Dust-free nature of product eliminates dusting and handling problems, according to manufacturer.

Description: Dye may be added to water being fed into preparation tank or directly to mixing chest. With either addition, it is quickly and uniformly distributed through fiber mass. Danger of color specks caused by undissolved dye is eliminated.

Stock solutions may be prepared in large quantities either for calendar work or for continuous addition. There are no preliminary problems of solubility or dilution.

(Green MX liquid is a development of American Cyanamid Company, 30 Rockefeller Plaza, New York 20, New York.)

Check 1732 opposite last page.

Ethylene carbonate is described in 16-page technical bulletin containing reaction and use information. There is a toxicity section and an annotated reaction and use bibliography. Ethylene Carbonate Bul — Technical Service and Development Dept., The Dow Chemical Company, Midland, Michigan.

Check 1733 opposite last page.

**S**TUDY the specifications of a typical controlled volume pump and you can quickly judge its accuracy... corrosion resistance... even controllability. But you'll find no specifications for dependability or low maintenance, which may be far more important in determining a pump's usefulness.

Over the years Milton Roy has studied thousands of pumps, comparing design and construction with service records, in an attempt to pin down the characteristics that contribute most to dependable pumping. Most of these characteristics demand more time consuming methods of manufacture and more expensive materials than conventional designs. All of them have been incorporated into the standard Milton Roy pumps.

**Alignment an absolute necessity**

The pump base has more to do with good pump alignment than any other single part, yet its importance is rarely recognized by the pump buyer. Dependable pumping demands an extremely rigid and sturdy webbed base that positively resists deformation and prevents the misalignment that is sure to result. Base pads should be machined to eliminate the problems of alignment and protecting rough cast parts.

Massive pump frames are another necessary bulwark against distortion. Just as rigid bases keep motor, drive, and pump aligned, heavy pump frames keep plunger, packing, and liquid end in line. As a result, both packing and plunger wear more evenly and give longer service.

**"Over-Engineering" assures longer life**

Typical examples of how dependability must be built into a pump are the crank nuts. Conventional hardware often permits slight crank slippage... just enough to throw an undesirable strain on the pump drive. Substituting more expensive brass nuts boosts costs, but,

**how to choose a dependable controlled volume pump**

These three Milton Roy pumps have been feeding phosphate solution to the boilers of a major East Coast brewer for twelve uninterrupted years. Aside from periodic lubrication and examination, the total cost of parts replaced in that time is just \$18.00... twelve sets of packing.

since they can be drawn up tighter, eliminates the problem of slippage.

Other examples of "over-engineering" that extend pump life include generous bearing surfaces that far exceed permissible minimums... self lubricating connecting rod bearings... special gear tolerances that eliminate grinding wear, vibration, and noise... and high cross head length to diameter ratios to absorb unavoidable abuse without injury. Furthermore, the surface of the pump must be protected with a resistant coating as protection against corrosive fume and splash.

**The low cost of dependability**

Obviously, a pump with features like these has to carry a higher price tag than one without. But the cost of dependable pumping is something else again. As the caption

above illustrates, savings gained through years of dependable pumping with minimum maintenance expense far outweigh any slightly higher initial cost. There's little doubt that the more dependable pump always costs less in the long run.

If accurate precision metering of liquids is one of your problems, look again to the enviable reputation more than 75,000 Milton Roy pumps have established for dependable controlled volume pumping.

Milton Roy Company, 1300 East Mermaid Lane, Phila. 18, Pa.



Controlled Volume Pumps • Quantichem Analyzers  
Chemical Feed Systems • pH Instruments

Check 1734 opposite last page.

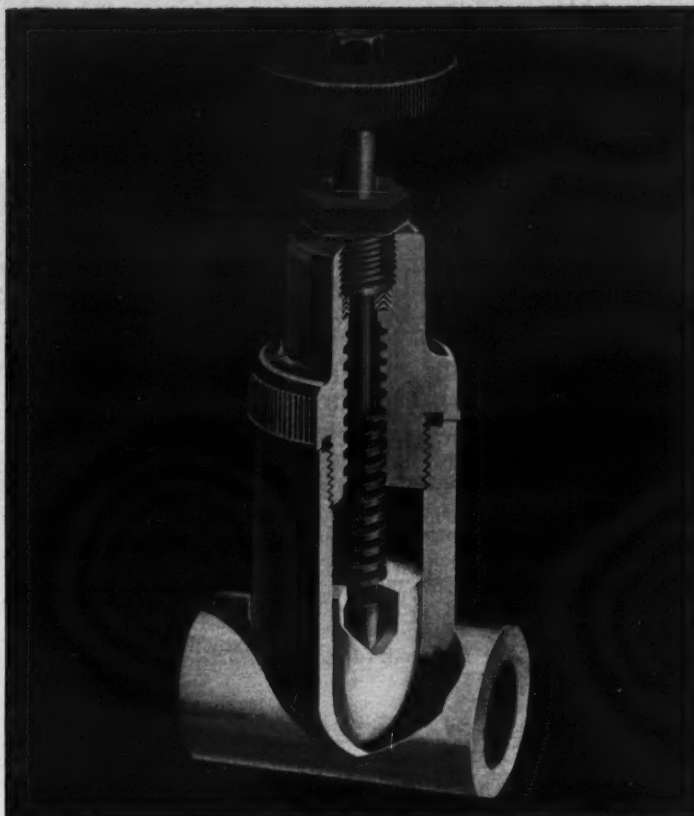
# NOW! THROTTLEABLE GATE VALVE IN PLASTIC

■ CHEMICALLY RESISTANT ■ NON-CONTAMINATING  
■ NON-GALLING ■ NOT SUBJECT TO GALVANIC CORROSION ■ EASILY MAINTAINED ■ LIGHT WEIGHT ■ LOW COST ■ FLEXIBLE CAP ABSORBS ABRASIVE ACTION OF SUSPENDED SOLIDS ■ NO-PRESSURE-DROP FULL FLOW

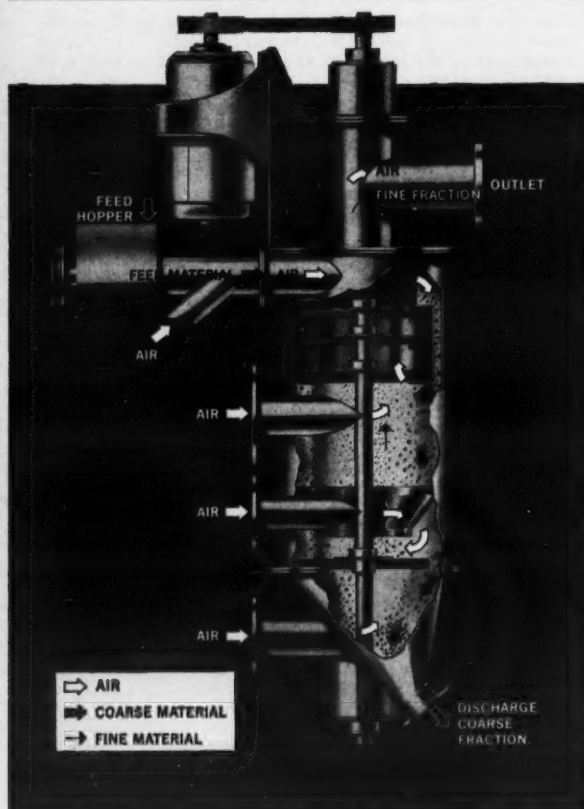
Here's a unique new valve design, in plastic, that combines the full-flow, non-pressure-drop characteristics of a gate valve with close throttling control usually possible only in a globe valve! Unique Design: This plastic valve is not a carry-over of metal valve designs; rather it is a completely new design conceived in plastic: the ONLY plastic gate valve that is also throttleable for flow control. Easy replaceability of flexible synthetic cap minimizes maintenance. When fully open valve back-seats, taking pressure off DuPont Teflon V-ring packing. Use it for all your corrosive, contaminable, and run-of-process fluid handling situations. Available in PVC, Kralastic, or Penton all-plastic construction, in 1/4"-2" sizes, and with screwed, socket-weld, or flanged ends.

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Check 1735 opposite last page.



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Designers and manufacturers of pulverizing, classifying and separating equipment for industry.

Check 1736 opposite last page.

## Euro-Report

From page 28

trogen products (primarily fertilizers) and plastics. In addition, Soda Fabrik offers a number of specialty items such as textile auxiliaries, detergents, leather auxiliaries, etc.

**Fabwerke Hoechst AG.**

This company is another of Western Germany's chemical giants, and has its main plant in Frankfurt. Hoechst has a complete chemical operation. Included in its broad line of products are dyestuffs, pharmaceuticals, inorganic and organic chemicals, plastics, fibers, fertilizers, insecticides and organic intermediates.

Hoechst has a strong research program and a fast rate of new product development. It overcame tremendous problems in sales, research and production after World War II. Its facilities, like many other chemical installations in the country, were virtually destroyed by aerial bombings. It is remarkable to see the outstanding progress made in rebuilding.

At Hoechst, chemists and chemical engineers are conscious of the developments in instrumentation and automatic control. Management, particularly, sees a shining future in the use of more automation and rationalization. (Rationalization here meaning process and cost analysis).

**Chemische Werke Huls**

Started in 1940, the company's initial production consisted primarily of synthetic rubber and ethylene oxide. Synthetic rubber production was not permitted from the end of the war until 1951, but this did not hobble the firm's progress since 80 percent of its product line has been developed from 1945 to the present. Twenty-five to 30 percent of production is based on coal, the balance on hydrocarbons from petroleum.

Its product line is broad. It features synthetic rubber with auxiliaries for processing rubber, plastics and plasticizers, and a variety of organic and inorganic materials.



## Henkel

Synthetic detergents are the main products of this progressive German company. Glues, detergents and sodium silicates, many of which are exported to the Near and Far East, comprise a smaller but very important portion of the product line.

Production initially was geared entirely to soaps and detergents. Later, it was set up for glues, adhesives and industrial glues.

Since Henkel's main activity is in synthetic detergents for consumer use, marketing problems are comparable to U. S. producers of such consumer products.

## CIBA

Principal products of this Swiss organization are dye-stuffs, pharmaceuticals and plastics. It is getting its "feet wet," however, in the melamine and epoxy fields, and has begun a new metals operation which includes work in niobium and tantalum.

Company's objective is to try to avoid making low-cost, highly competitive products. It thus stays away from many basic operations. Because of the product line, many operations are batchwise, but studies are being made constantly with an eye toward possible continuous operation.

New expansion at Toms River, N. J., means greater production in the U. S., but expansion in Switzerland is handicapped by lack of land area. As a result, new buildings are multiple-storied to increase productive area.

The four chemical manufacturing companies in Basle attempt to plan research in four directions to avoid duplication of effort.

## Lonza

Here's another Swiss company which in recent years has become a sizable producer. Main products consist of carbide, acetylene, acetylene derivatives, vinyl chloride and vinyl acetate, as well as polyvinyl acetate and polyvinyl chloride.

To next page

# Announcing the new GLAS-COL Desiccator heating mantle



*... it assures even heating which minimizes chance of thermal strain to glass vessels.*

*... it provides an effective shield for personnel in the rare instances when glass vessels do collapse.*

This new, aluminum-housed electric heating mantle is specifically designed for heating heavy-walled vessels in which vacuums must be created to permit the drying of various samples.

As a result of the high pressure due to conditions of high vacuum, heavy-walled vessels occasionally collapse. When such accidents happen, the Glas-Col aluminum-housed heating mantles provide a very effective shield to protect personnel from flying glass and chemicals.

Glas-Col mantles have been used to heat desiccators for several years ... with complete success.

*Glas-Col Desiccator mantles are priced from \$45.00 to \$57.00*

Catalog No.	Desiccator Flange Diameter	Watts (115 Volts)	Price
M-200	160 mm	330	\$45.00
M-202	200 mm	380	57.00
M-204	250 mm	380	57.00

Glas-Col Apparatus Company  
Dept. CP, 711 Hulman Street, Terre Haute, Indiana  
*... the world's largest manufacturer of heating mantles*

U.S. Patents  
2,282,078  
2,739,220  
2,231,606 and  
2,739,221

# GLAS-COL

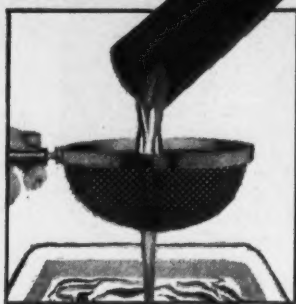
# ELECTRIC HEATING MANTLES

A complete line for laboratory, pilot plant, and chemical process heating applications.

Check 1737 opposite last page.



# Fibercast <sup>NON-CORROSIVE</sup> PIPE **PREVENTS CONTAMINATION**



**FIBERCAST**

How Fibercast Pipe is the answer to the dual control of contaminants is best explained through the above simple illustrations.

The smooth interior of Fibercast (Hazen-Williams C Factor-147) prevents the accumulation of contaminating globules, slime and sediment on the pipe's walls. And, since Fibercast is non-corrosive, it does not create a contaminant such as iron oxide and bacteria residue as is the case in many other piping systems. If the stream is non-contaminated when it enters a Fibercast line it is just as pure when it leaves!

Fibercast is the solution to your piping problems, whether they be contamination, corrosion, weight or many other factors. Get the complete Fibercast story. Send the coupon below for the newly-published Bulletin No. 20.



**OTHER PIPE**

TO SOLVE YOUR CORROSION PROBLEMS . . . visit the FIBERCAST Display at The 1959 Exposition of Chemical Industry, Coliseum, New York City, Nov. 30 - Dec. 4 Booth 870 3rd Floor



## **FIBERCAST COMPANY**

A DIVISION OF THE YOUNGSTOWN SHEET AND TUBE COMPANY  
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SAND SPRINGS (TULSA), OKLAHOMA

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Name \_\_\_\_\_ Title \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

Check 1738 opposite last page.

## **Euro-Report** *From preceding page*

The company's interests also lie in the fertilizer field, but it feels Swiss farmers are backward in accepting commercial fertilizers. Company officials believe that this is particularly true of the smaller farmers.

Lonza is a large supplier to other chemical companies in Switzerland, such as Geigy, Santo, CIBA and Hoffmann-LaRoche.

### **Montecatini**

This mining and chemical company is the largest in Italy. Its rebuilding and expansion program since the end of the war has been remarkable.

Among its many products are sulfuric acid and derivatives, nitrogen and derivatives, and other complementing inorganic chemicals. Coal and petroleum hydrocarbon derivatives include dyestuffs, intermediates, pharmaceuticals, textile fibers, plastics and others.

Montecatini's expansion in petrochemicals has considerably broadened its scope. The Brindisi plant in southern Italy—now under construction—will be the same size as the Ferrara facilities. About one million tons of Mideast crude oil will be processed annually at Brindisi. The plant is expected to be on stream in late '61 or early '62. A new plant for producing fiber based on polypropylene is due to be completed by the end of this year.

In the petrochemical field, the company's activity is directed along the line of plastics, fibers, film and elastomers. It expects to have fiber and film based on polypropylene in commercial production next year.

Although elastomer activity is still in the experimental stage, a copolymer recently developed has properties of synthetic rubber and should be competitive with this synthetic. This is a true copolymer of ethylene and propylene, not a mixture.

Montecatini is a primary producer of heavy chemicals,

but it is also vitally interested in the new metal fields—niobium, vanadium molybdenum and chromium. Metal activity is tied in mostly with nuclear operations.

The company is generally basic, and studies the organic and intermediate fields quite thoroughly. Currently, it has no plans to enter the field of smaller volume end products.

The firm has processes for making nitric acid, contact sulfuric acid, oxyalcohol, ammonium phosphate and others which it is interested in licensing. Montecatini recently made arrangements with Wyandotte to make polyethers under Wyandotte's process.

### **Phillips-Roxane**

Producing pharmaceuticals, animal and plant nutrients and plant protection products are the main interests of this Dutch company.

Its growth, starting in 1948, has been phenomenal. A production rate of two million guilders in that first year of operation has increased to 100 million guilders this year.

In building for this rapid growth, a start was made by instituting a strong research program. The plant wasn't



*"The boss knew what he was doing when he put up that sign. I kept busy all day yesterday trying to figure it out."*

built until the research program was completed.

One of the major accomplishments in the 11 years since the company was formed was development of a new process for making insulin.

Current company policy is to look at the potentials for a given product in its market, then develop the product or a process for making it.

The Dutch chemical industry assuredly will become more competitive when a new plant is completed at Schaaps-laan Delft. Opening of this new facility likewise is expected to make the country more dependent on its own raw material sources.

#### Organisch Chemisch Instituut

This Dutch organization is part of the central organization for applied scientific research in The Netherlands. It is a government-supervised operation.

Organisch Chemisch Instituut, under direction of Professor Doctor G. J. M. van der Kerk, has as its purpose exploratory research in the field of applied organic chemistry and biochemistry. The work is done both independently and in cooperation with organizations inside and outside the central group.

Its work in the field of organic chemistry includes fungicides, nematocides, plant growth regulating substances, chemical studies in the fields of antibiotics, and research in the field of organo-metallic chemistry.

The institute does paid research work of a diversified nature for The Netherlands as well as for foreign industrial and private organizations.

Its facilities are most complete and very modern. It has a great diversity of reaction apparatus, and is able to perform synthesis on the scale of one to twenty-five kilograms.

Dr. van der Kerk pointed out the difference in standing of PhD's in America and in Europe. He cited the high social standing which doctors of

## EFFICIENCY IN A SEMICONDUCTOR RECTIFIER

Today, in the electrochemical industry, the economy of the semiconductor rectifier as a source of d-c is scarcely disputed. Certain differences in efficiency, however, can produce significant differences in the ultimate economy which the user may enjoy. For example, the I-T-E UNITRON semiconductor rectifier incorporates unique design details which aim specifically to boost efficiency.

**Voltage equalization**—Variations in inverse resistance of semiconductor cells are normal. When cells are used in series, some method of inverse voltage equalization is required to prevent overworking of certain cells. Many seemingly obvious methods, such as using resistors or connecting complete rectifiers in series, etc., are uneconomical as regards both operating cost and space. For the UNITRON, I-T-E engineered a special circuit in which a small auxiliary transformer is used to maintain an equal inverse-voltage on all series cells without taking current from the system. This transformer, in fact, consumes no power. It needs no maintenance. And it makes possible the instant detection of cell failures for timely replacement before an entire series of cells fails.

**Current equalization**—Parallel connected cells will normally divide the total forward current unequally because of differences in forward resistance. Therefore cells with the lowest forward drop will carry a disproportionately higher share of the total current. But the UNITRON's unique current equalizer insures that all parallel cells will carry equal current, regardless of normal variations in forward resistance. The design is of the utmost simplicity, consisting entirely of iron laminations through which conductors from the parallel cells pass. There is nothing to fail or need service during the life of the rectifier. The action of this compact cur-

rent equalizer materially extends cell life and keeps cell maintenance cost and downtime to a minimum.

**Random cell selection**—The combination of forced voltage equalization for series cells and forced current equalization for parallel cells gives the I-T-E UNITRON virtual freedom from the effects of normal variations in cell resistance. Users may select cells at random for any position. This eliminates the nuisance—and the expense—of coding cells for various positions. Yet at the same time you have greater assurance of long cell life, because the overloading of individual cells is eliminated.

**Water cooling**—Just in the cooling system alone, the I-T-E UNITRON saves money over other rectifiers. First, it costs so little to operate. Second, it takes little space. Third, it prolongs average cell life. It uses ordinary tap water . . . no coolant is more efficient than water or costs less. A purification system continually removes contaminants and free ions to protect the system from corrosion and prevent electrical leakage. Since it is a closed loop system, it cools each cell to the same temperature . . . eliminating hot cells and premature failures. And it permits the changing of cells without disturbing the cooling system. This unique I-T-E UNITRON cooling system eliminates the need for power-eating blowers and space-eating ducts. Also it saves the cost of special coolants and spares personnel from the risk of skin irritation.

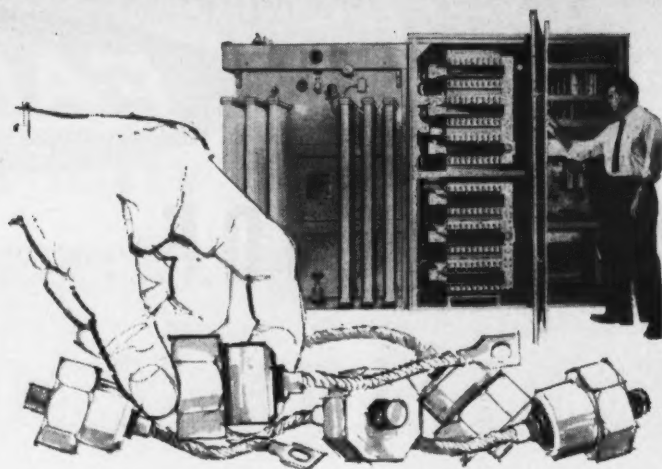
All these design features of the I-T-E UNITRON add up to higher operating efficiency and lower operating cost. The UNITRON is available in any desired d-c voltage and current rating. It can be used in parallel with any other type of conversion equipment. Discover how you can benefit from these advantages. Write I-T-E Circuit Breaker Company, Transformer & Rectifier Division, 1900 Hamilton Street, Philadelphia 30, Pa.

Visit the I-T-E display in booth 25 at the 27th Exposition of Chemical Industries

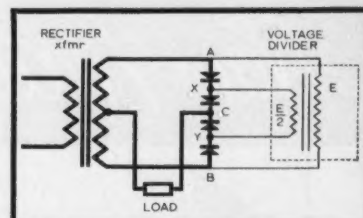


## I-T-E CIRCUIT BREAKER COMPANY

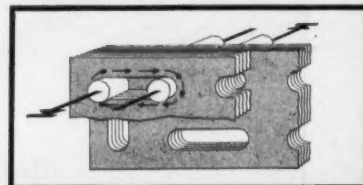
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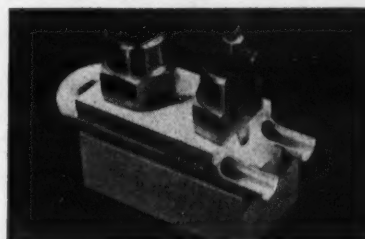
The I-T-E UNITRON Semiconductor Rectifier



Simplified schematic of voltage equalizer. When side A is conducting, voltage between C and B is equal to that between A and B (neglecting the small drop through the cells). The voltage divider secondary applies a voltage between C and Y which is half that between C and B. This divides the inverse voltage between the two non-conducting cells evenly.



The current equalizer. Adjacent conductors carrying current in opposite directions pass through overlapping windows in two sections of iron laminations. Transformer effect of laminations effectively equalizes currents between neighboring conductors.



Section of bus bar . . . showing how cooling water flows close to cells for efficient cooling. Bus bar can be as long as necessary to hold the number of required cells. No need to drain system to change cells.



# MORE **FANSTEEL**<sup>®</sup> ACIDPROOF TANTALUM EQUIPMENT

*Now Available from Stock\**

**THERMOWELLS** A large variety of Fansteel Tantalum Thermometer Wells are available for prompt delivery. They are quickly fabricated to your specified length from the standard size components listed below:

STOCKED TUBING OF THESE DIAMETERS ARE COMBINED

Tubing, I.D.	1/2"	3/4"	1"	1 1/4"	
WITH ANY OF THESE STOCKED FLANGES FOR QUICK FABRICATION					
Flanges, O.D.	2"	2 1/2"	3 1/2"	5"	6 1/4"

## BAYONET HEATERS

Single tube types are stocked in sizes of:  
18" long x 1" diam.; 30", 48" and 60" lengths x 1 1/2" diam.  
Three-Tube types 69" long x 1 1/2" diam. from stock.

## CONDENSERS

Fansteel stocks tantalum tapered tube condensers in 3" x 2" x 36",  
6" x 2" x 60" and 8" x 4" x 60" sizes.

**\*SEE THEM . . . BUY THEM AT BOOTH 617 CHEMICAL SHOW  
N. Y. COLISEUM—NOV. 30—DEC. 4, 1959**

Fansteel will have stocks of tantalum chemical equipment at the  
New York Chemical Show. Standard sizes on display will be available  
for sale, f.o.b. New York (or North Chicago) for your convenience.

Address inquiries to:

Equipment Department, Metals and Fabrication Division

**FANSTEEL METALLURGICAL CORPORATION**  
NORTH CHICAGO, ILLINOIS, U.S.A.

## Euro-Report

From preceding page

chemistry and chemical engineering hold in Europe.

He feels strongly that America should give greater recognition to these men who, he said, have spent so much time in preparing themselves for careers in these fields. Dr. van der Kerk indicated a PhD in Europe has the same social standing as a judge or a burgomeister.

## Look Into Future

Amazing vitality is being shown by Western Europe's chemical processing industries. They have grown remarkably since war's end, and their rebuilding program has been nothing short of spectacular.

What about the future? It appears rosy indeed provided the Russians stay in their own backyard and world economic conditions remain pretty well stabilized.

Western Europe chemical manufacturers will strive more and more to imitate patterns of research and development so prevalent in the United States.

There's great confidence in the ability of CPI to continue its tremendous growth—a feeling probably engendered by widespread enthusiasm for the Common Market.

The potential market for chemicals and chemical products in ALL of Europe is virtually untapped. Its possibilities might be likened to the virgin resources of America prior to opening of the West.

It will be a wise move for American chemical manufacturers to get on the bandwagon by joining with Western European counterparts in joint ventures or other arrangements.

## NEXT MONTH

Is filtration a bottleneck in your process? If so, a story in the December New Solutions section will be of special interest to you. It tells how a simple rotary filter test leaf helped to whip the problem at Esso. Be sure to read it.

Check 1740 opposite last page.



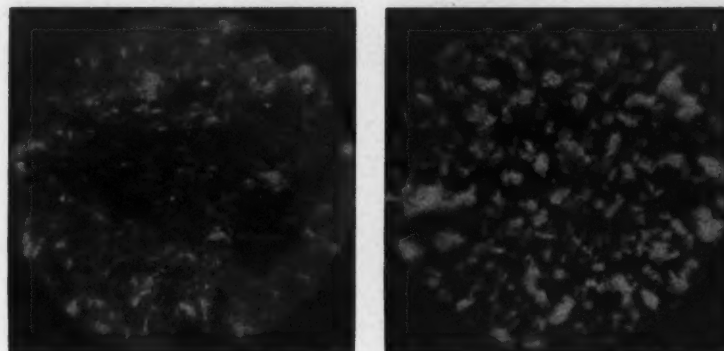


**IDEAS:**  
from other industries  
and nuclear field —  
new trends in research,  
processes, services

# Speeds crystallization of fatty acids

**Economic process teams up 'crystal modifier'  
with efficient shock-cooling device; uses less sol-  
vent, equipment, and manpower**

**W. A. SINGLETON and C. J. CHANDLER**  
Girdler Process Equipment Division  
Chemetron Corporation, Louisville, Kentucky  
with CP Staff



Effect of crystal modifier is shown in these photomicrographs of saturates crystallized from 40% solution of tallow acids in acetone. Material at left contained no additive, reveals no definite crystalline structure. Product at right had 0.1% additive, exhibits clearcut patterns

**F**aster, better, and more economical separations of fatty acids by solvent crystallization are being reported through use of a recently developed continuous process. Based on use of an organic additive that works equally well in either fatty acids or triglycerides, process cuts separation time from days down to hours, when compared to conventional batch processes.

Solvent requirements are slashed. Only about one-half the solvent-to-feed ratio of conventional processes is used. Equipment, manpower, and operating costs are also substantially reduced.

Process makes use of extremely rapid, continuous chilling — shock-cooling — a procedure that has heretofore been avoided in fatty acid crystallization processes. The additive, a light-colored, flaky material, dissolves completely in fats and fatty acids, but only sparingly in the organic solvent used in the process.

The exact composition of the additive is being kept under wraps. Referred to only as a "crystal modifier", the

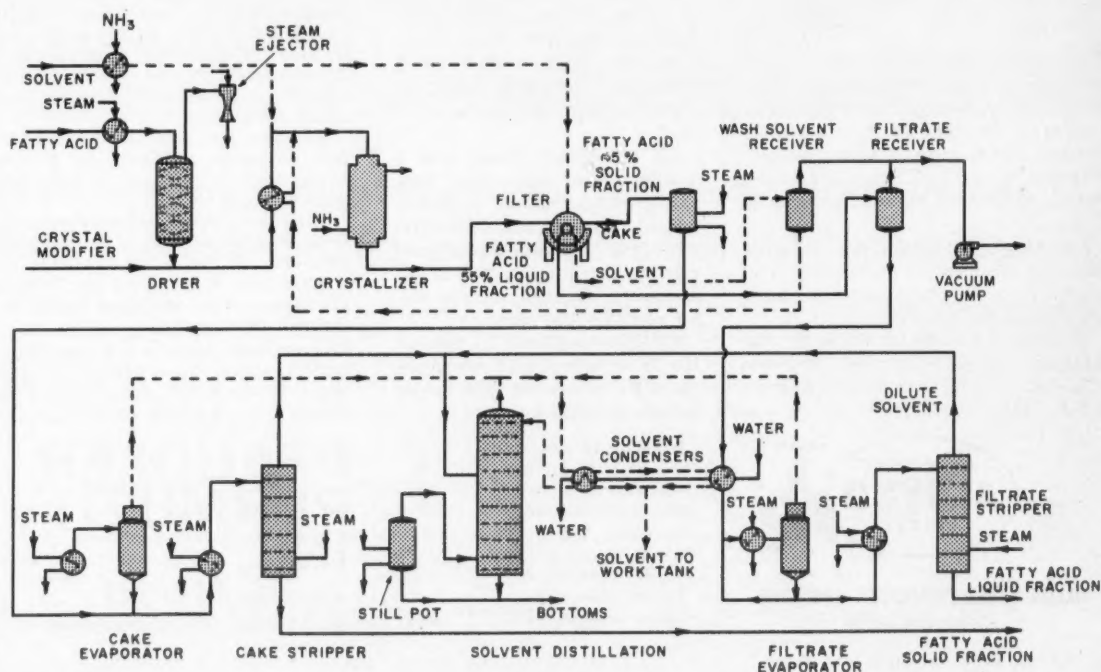
material is known to be a fatty acid derivative and is available in commercial quantities. It causes rapid formation of crystals when the feedstock is shock-cooled below its normal solidification point. Resultant slurry is easy to filter and the cake can be readily washed.

The additive also has the property of controlling the type of crystal formed when the mixture is cooled. This makes it possible to process a

slurry having a high solids content without difficulty and explains the low solvent-to-feed ratio required in the process. The crystal modifier essentially eliminates blinding of the filter medium. This contributes greatly to the increased production capacity of a given size plant.

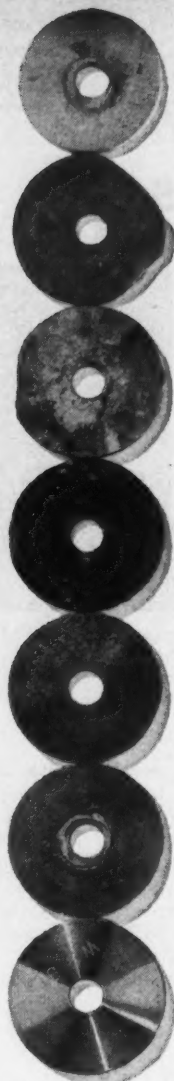
In operation, fatty acid feed stock is dried and then mixed with 0.1 to 0.15% crystal modifier. Mixture is next dissolved in chilled solvent, such as acetone. Solvent is used in proportion of from 1.5 to 2 parts by weight per part of fatty material.

The resultant solution is



Fatty acid crystallization process cuts fatty acid separation time from days down to hours. Heat exchange between process streams boosts overall efficiency. Solvent flow is indicated by dotted lines

## Which valve alloy?



Corrosion testing, which often includes analysis of test specimens like those shown above, insure Aloyco valve customers of the right alloy for each job. Typical metals used in Aloyco Valves: Types 304 and 316 Stainless Steel, Aloyco 20, Nickel, Monel, Hastelloy B, C and D.

At Aloyco, 30 years experience in stainless steel valves exclusively is at your service. Our field consulting service is yours for the asking.

On your next valve job call in the specialists... write Alloy Steel Products Company, 1302 West Elizabeth Avenue, Linden, New Jersey.

9-14



**ALLOY STEEL PRODUCTS COMPANY**  
Linden, New Jersey

Check 1741 opposite last page.

## IDEAS

then passed through a high-efficiency Votator heat exchanger which acts as crystallizer. Shock-cooling with  $-10^{\circ}\text{F}$  ammonia results in almost immediate crystallization.

Slurry leaving crystallizer is transferred to conventional rotary vacuum filter. Filtration takes place at about  $0^{\circ}\text{F}$ . Unit has no special features other than provisions for applying wash solvent to the cake and an enclosure to avoid solvent losses.

Filtrate is passed through solvent recovery system consisting of flash evaporation followed by steam stripping.

Washed cake is freed of most solvent by vacuum on filter. Cake is dislodged from unit by inert gas pressure. Cake passes into discharge chute and drops to melt tank. Cake fraction then goes through its own solvent recovery system, similar to that for the filtrate.

### Recrystallization

If it is desired to produce an extremely pure cake, product is not immediately freed of solvent, but is instead recrystallized. Clean solvent is used to wash the cake on second-stage filter. Solvent moves countercurrent to flow of fatty acid, being used first to wash second-stage cake, then to dissolve cake from first-stage filter, next to wash first-stage cake, and finally to dissolve incoming fatty acid feed.

An additional cooler and a smaller filter are the only equipment necessary to incorporate second crystallization step into process. Extra solvent recovery apparatus is not necessary. Overall solvent ratio remains the same.

Utilities required to process 100 lb of tallow acid feedstock (at  $0^{\circ}\text{F}$ ) at rate of 2500 lb per hr are as follows:

Steam at 25 psi, lb	14
Steam at 125 psi, lb	86
Water at $85^{\circ}\text{F}$ , gal	755
$\text{NH}_3$ at $-10^{\circ}\text{F}$ , tons	2.7
Electricity, kw	1.5
Air at 40 psi, scf	120
Crystal modifier, lb	0.15
Solvent makeup, gal	0.03
Labor, manhours	0.08

To page 86

# FLUIDICS

is a Pfaudler Permutit program providing  
the know-how  
the equipment  
and the experience  
for solving problems involving fluids

FLUIDICS covers:

corrosioneering  
water treatment  
reactions  
waste treatment  
fluid analysis  
agitation  
distillation  
blending  
metering  
piping  
storing  
heat transfer  
centrifuging



FLUIDICS AT WORK

## How dimpled jackets slash cost of stainless steel reactors

By using dimpled jacket construction on large stainless steel reactors, Pfaudler reduces material costs as much as 20% over conventional jackets. Dimples reinforce both the tank metal and the jacket metal. Thus, lighter gauges can be used for the same jacket pressures, or conversely, higher jacket pressure ratings can be achieved with the same metal thicknesses.

Dimples also serve to interrupt the flow of jacket medium and produce maximum turbulence. Higher heat transfer rates result.

Pfaudler dimpled jacket construction is code approved for 150 psi jacket pressure and can be so stamped. This construction is standard on Pfaudler stainless steel reactors from 750 through 2000 gallons.

Conventional Jackets are supplied on 5 through 500 gallon Pfaudler reactors since the economic factors favor this design over dimpled construction.

**Choice of Stainless Types.** Through 500 gallons, types 304 and 316 are standard. Larger reactors are offered in these two types as well as 321 and 347 stainless.

**Other Metals and Alloys Offered** on custom order include Hastelloy B or C, nickel, Monel, Inconel, titanium, zirconium, and tantalum. Solid, clad or lined construction adds further flexibility to your selection.

**Glaesteel Reactors Too.** Complete range of sizes through 4000 gallons, many of which are pre-stocked for quick delivery.

This wide range of choice of design and materials is typical of the solutions offered to problems through the FLUIDICS program. For further information on stainless steel, "wonder" metal or Glaesteel reactors, write our Pfaudler Division, Dept. CP-119, Rochester 3, New York.

### FLUIDICS AROUND THE WORLD

Pfaudler Permutit is observing its 75th anniversary. The company has manufacturing plants in Germany (Pfaudler-Werke A.G.), Great Britain (Enamelled Metal Products Corp., Ltd.), Canada (Ideal Welding Co. Ltd.), Mexico (Arteacero-Pfaudler, S.A.), and Japan (Shinko-Pfaudler Co., Ltd.), and four plants in the U. S. Sales offices and representatives in leading cities throughout the free world.

## PFAUDLER PERMUTIT INC.

Specialists in FLUIDICS...  
the science of fluid processes

Check 1742 opposite last page.

CHEMICAL PROCESSING



THAT'S  
INTERESTING

#### Sweet tooth

Americans ate 2.83 billion lb of candy last year, up 2% over 1957. Tab for filling the 1958 sweet tooth was \$1.11 billion.

#### Cool, man!

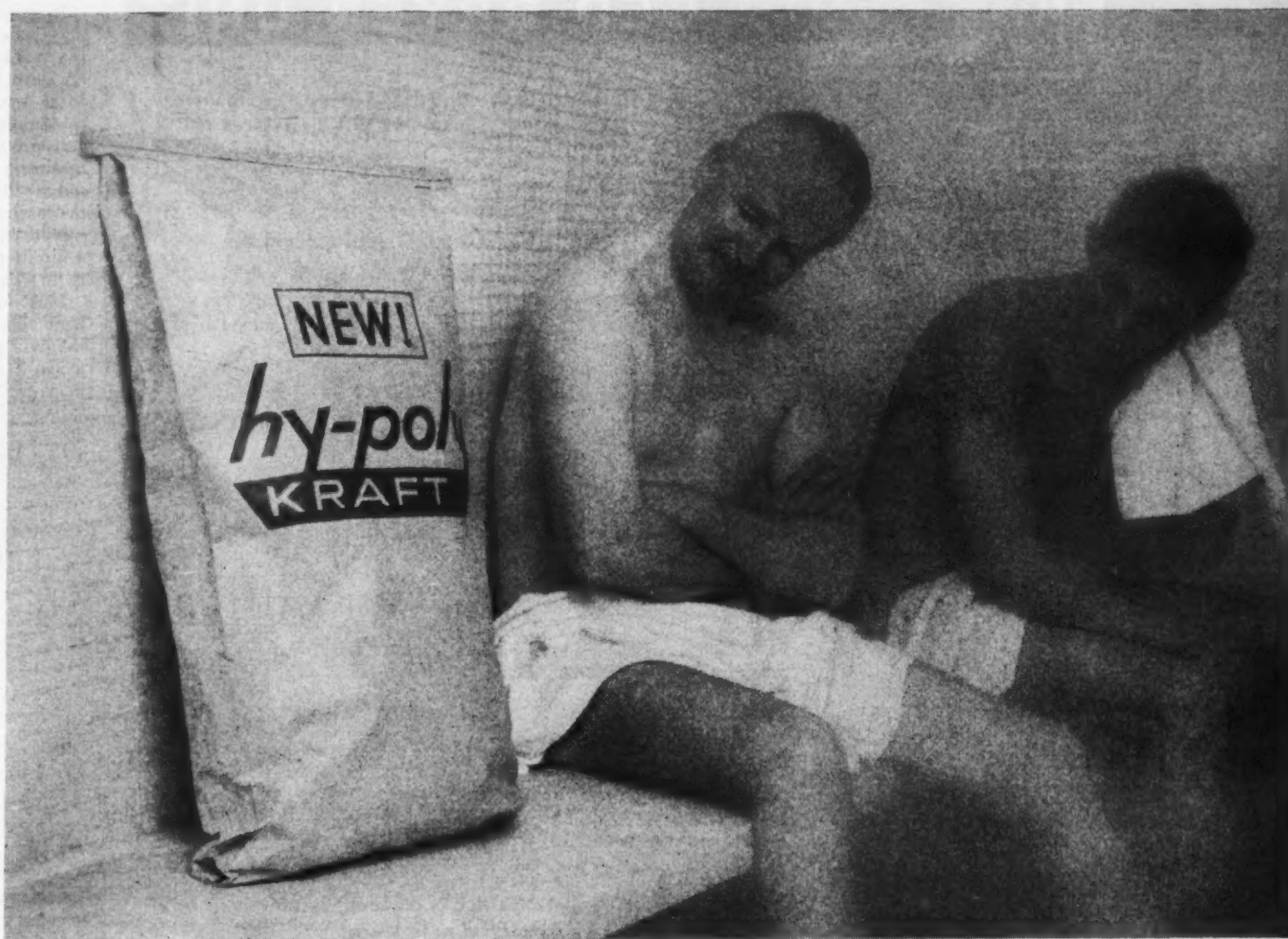
Urethane interlined clothing is providing utility and comfort to workers whose jobs require them to be inside freezer or hardening rooms. These garments have been found to appreciably reduce out-of-freezer time, thus increasing production.

#### Plastics aid fire safety

Visitors to the U. S. Cultural Pavilion in Moscow this summer were assured of top protection against fire. A fiberglass-reinforced polyester resin was used for the 70 molded plastic 16-ft columns and the 15,000-sq ft free-form roof structure.

For more information on product at right, specify 1743 see information request blank opposite last page.

## Now International Paper saves you \$5 to \$16 per thousand PE multiwalls!



### Read why new humidity-proof "Hy-poly" kraft makes medium and low-density polyethylene sheets extravagant!

**T**HE multiwall bag you see taking a Turkish bath in our picture contains calcium chloride.

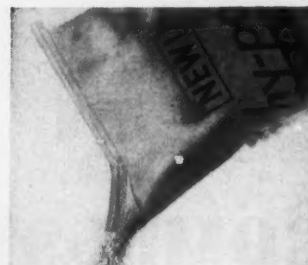
We steamed this new Bagpak® multiwall in 95% relative humidity at 120° F. for 48 hours. (Unprotected, under these conditions, this chemical takes on 2½ times its weight in water in about an hour!)

But when we opened up the bag, the thirsty crystals spilled out as though they had been stored on the Sahara!

And Bagpak's new Hy-poly kraft *saves you money*. You stand to save from \$5 to \$16 per thousand multiwalls!

That's because new Hy-poly kraft is so superior to medium and low-density PE sheets that you get equal, if not greater, moisture-vapor protection from a coating approximately *half as thick!*

Extensive laboratory tests prove that this dramatic new barrier sheet is superior in *every way*. Write us today for samples.



See how calcium chloride protected by Hy-poly kraft Bagpak, pours after 48-hour steam bath!

Bagpak Division **INTERNATIONAL PAPER** New York 17, N. Y.





# See the NEW Raymond



## FLUID BED DRYER UNIT

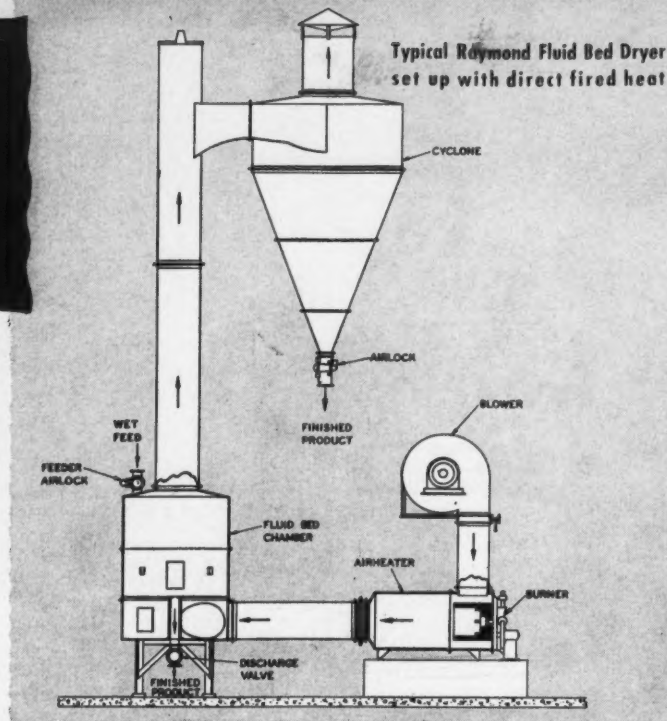
ON EXHIBIT IN  
**BOOTH 646**  
CHEMICAL SHOW  
Nov. 30—Dec. 4  
NEW YORK COLISEUM

A working model of the Raymond Fluid Bed Dryer in clear plastic construction will be featured at the Chemical Show.

Also a working model of Flash Drying System . . . an actual 18" Vertical Mill specially adapted for pulverizing solid rocket oxidizers . . . and a Mechanical Air Separator.

### PRINCIPAL ADVANTAGES

1. High thermal efficiency
2. Small space requirements
3. Absolute minimum of moving parts (none in high temperature zone) helps to reduce maintenance
4. Gentle handling gives minimum degradation
5. Permits some degree of particle size classification
6. Accurate control of final  $H_2O$
7. Continuous, automatic, dust-free operation.



Raymond started development work on the Fluid Bed type of dryer in 1950 as a complement to the well known line of Flash Drying Systems.

This broadened the range of dryers for handling problems where a very minimum of crystal breakage is required, as well as in processes where appreciable retention time is desired.

The first commercial size Raymond Fluid Bed Dryer was installed in 1953 on a problem requiring minimum crystal breakage. Since then, additional units have been installed by themselves or in conjunction with Flash Drying Systems.

Salt, gilsonite, synthetic resins and organic crystals are being handled in these units. Successful test work has been conducted on a variety of other materials.

With the broadened line of drying units now available, it is even more important to consult Raymond engineers when your drying problems come up. A Raymond Fluid Bed or a Flash Dryer could well be the best solution to your problem.

### IDEAS

#### Crystallization

From page 84

Process has been under pilot plant development for over two years. It has been tested on both fats and fatty acids. With fats, major objective was to separate naturally occurring mixtures into fractions, at least one of which is more valuable than the feedstock. In processing fatty acids, attempts were made to produce a number of fractions presently in commercial demand.

Most of work to date has been carried out with lard, tallow, and distilled tallow acids. Some experiments have been performed on undistilled tallow acids, and on light ends cut from tall oil. Future work will include runs with cottonseed and soybean acids, and tall oil fractions.

(Further information about the crystal modifier or crystallization process may be obtained from Girdler Process Equipment Division, Chemetron Corporation, Louisville, Kentucky.)

Check 1745 opposite last page.

#### Heat exchanger manual saves time, simplifies vendor communications

With standardization of heat exchangers for process plant service still something for the future, a manufacturer has decided that much can be privately accomplished towards simplification and classification of exchanger components.

Consequently, a 92-page manual has been published which in six illustrated sections puts mechanical design features of exchangers on a systematic basis. Six basic designs of exchangers are used — a fixed tube sheet, a U-tube, and four floating heads. In the section on "Principal Components," 17 front head, 16 shell section, and 28 rear head designs are shown in graphic form with code designations.

Each group is re-displayed in greater detail with added nomenclature and commentary. Cross-section drawings

# COMBUSTION ENGINEERING, INC.

1116 W. BLACKHAWK ST.  
CHICAGO 22, ILLINOIS

## Raymond Division

SALES OFFICES IN  
PRINCIPAL CITIES

Combustion Engineering-Suppreheater Ltd., Montreal, Canada

Check 1744 opposite last page.

ENTER THE NEW

# It Pays to See Victor

## CONTEST

Win a glorious, glamorous all-expense trip for two to London, Paris and Rome for the 1960 Olympics

**50 Prizes 50**

**First Prize:** You board a Pan American Jet Clipper in New York... streak across the Atlantic to London... spend a few carefree days there and in Paris, the queen city of the continent. Then on to Rome and the Olympics.

Win first prize in the new "It pays to see Victor" contest and this fabulous, unforgettable European holiday for two is yours! You'll never forget seeing the thrilling ceremonial open-

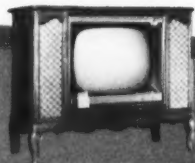
ing of the Olympics on August 25—or the grandeur and the glory that is Rome, the Eternal City.

Here's all you do to win. Complete the puzzle inside and mail your solution. Clues are plentiful (don't overlook the help on the back page). You'll have a chance to pick up extra clues if you stop at the Victor Booth at the 27th Exposition of Chemical Industries show in New York November 30—December 4.



**SECOND PRIZE:**

*Zenith Stereo Hi-Fi Console.* This exquisite mahogany model will bring the finest recorded music to life. A breathtakingly beautiful addition to your home.



**THIRD PRIZE:**

*Zenith Space Command Console 21" TV*



**10 FOURTH PRIZES:**

*Zenith Portable TV sets with 17" screens*



**15 FIFTH PRIZES:**

*Zenith AM-FM table radios*



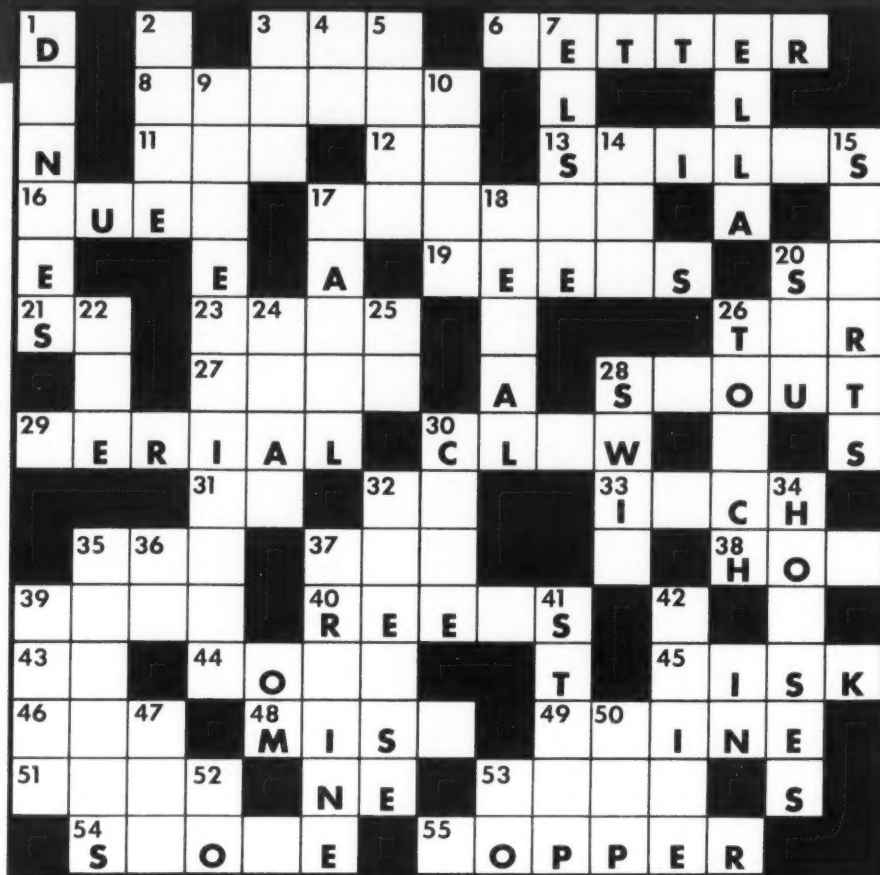
**22 SIXTH PRIZES:**

*Zenith Transistor Radios*

"IT PAYS TO  
SEE VICTOR"

# Contest

it's Easy  
it's Fun!



## OFFICIAL ENTRY BLANK

"IT PAYS TO SEE VICTOR" CONTEST,  
Box 5907, Chicago 77.

Name \_\_\_\_\_

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Company \_\_\_\_\_

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City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

## HERE'S ALL YOU DO...

Study the clues carefully, then fill in the missing letters in the puzzle. Clues to some of the names or abbreviations of Victor chemicals in the puzzle are given in the story on the back page. Extra clues will be available in Victor's Booth at the New York Chemical Exposition at the coliseum. One word of caution: a few of the *regular* word choices are tricky. So, be careful. Winning entries will be selected on the basis of the rules given on the opposite page. The correct solution to the puzzle is locked in the vaults of The First National Bank, Lake Forest, Illinois.



IT'S A JET CLIPPER TOUR FOR  
**2 TO Europe**  
 AND THE 1960 OLYMPIC GAMES

**49** MORE  
 WONDERFUL PRIZES!

**CLUES ACROSS**

3. Product of combustion.
6. Hospital patient should be glad to get this.
8. First two words of a truism known to buyers of chemicals (See 9 Down).
11. Very small round mark.
12. Greek letter associated with 3.14159.
13. One is enabled to get up and down with the help of the steps on these.
16. You play billiards with them.
17. Acid used in leather tanning and in dyeing textiles.
19. Percolates.
20. Is that — ?
21. One kind of thoroughfare (abbr.).
23. Abbreviation of a chelating agent used to control metallic ions in water.
26. Rocky pinnacle or peak.
27. Meat of calves.
28. There are certain conditions in which a hard blow may cause one to be broken off.
29. Not every — ERIAL is suitable for TV.
30. Bloody this may well be helpful in solving zoo keeper's mysterious death.
31. Letters of the chemical symbol of element combined in a sodium phosphate used in household cleansers.
32. Abbreviation of chemical intermediate used in organic synthesis.
33. Encouragement should be freely given to person who may I — CH to reach a worthy goal.
35. Victor has a — of satisfied customers.
37. Tree of the genus Ulmus.
38. You'd expect to see one on a farm.

39. Prefix of phosphate used in liquid detergents.
40. Seeing these ahead, steersman is likely to avoid that stretch of water.
43. "A Streetc — Named Desire".
44. European city which winner of "It pays to see Victor" contest will visit and attend 1960 Olympic games (European sp.).
45. Hazard.
46. Tear with violence.
48. Sharpshooter may blame this for his low score.
49. River in Germany noted for castles.
51. Phosphoric solution widely used for metal finishing and rust prevention.
53. Weaving frame.
54. It's likely that amount of insurance owner carries on this will vary with its size.
55. Young hoodlums cutting up on New Year's Eve may well regret letting fly with snowballs at passing — OPPEP.

10. Term of respectful address to men (plural).
14. Abbreviation of phosphate used as mineral supplement and conditioner in foods.
15. Coaches often make use of such films in training their teams.
17. Deadly.
18. Junk dealer probably would be able to give you some idea of its worth.
20. French coin of trifling value.
22. Each time he drives, good golfer will see that this is in the right place.
24. F. D. Roosevelt is associated with the New —
25. Other nickname of fellow who might also be called Bert.
26. You're smart to proceed with care if you have to rely on this.
28. One might find this quite stimulating.
30. Arrived.
32. Aim of Victor Chemical is to — its customers.
34. It's generally sad when they have to be destroyed.
35. Song poems.
36. Sink — swim.
37. White fur prized for its fineness and pure color.
39. Prefix of an organic chemical used in pesticide formulations.
41. What the barber uses to hone a razor.
42. In certain cases, whitewashing is one way some people deal with —
47. Hole in the ground.
50. Lindbergh's — across the ocean won him world fame.
52. When there's anything Victor can — for you, just say the word!
53. Behold.

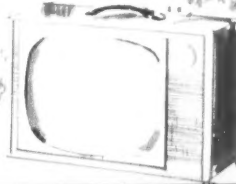
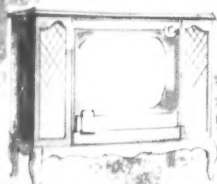
**CLUES DOWN**

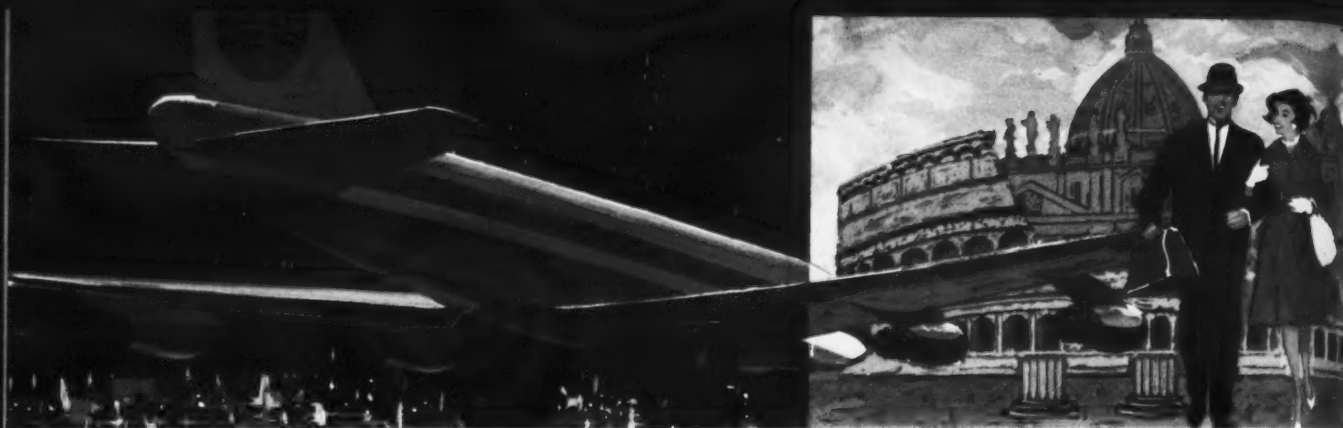
1. Instructor's college diploma will hardly be useful if she only has to teach D — NCES.
2. From those who tip him, cab driver makes quite a little on the — IDE.
3. Suitable.
4. South America (abbr.).
5. Prefix of a Victor chemical used in electroless nickel plating.
7. Girl's name.
9. Last three words of a truism known to buyers of chemicals (See 8 Across).

**Rules**

1. This is a contest of skill. Study the clue definitions carefully before writing in your answers. There is only one correct solution. If no correct solution is received, those most nearly correct, based on the clue sequence described below, will be selected as winners. Judges have been appointed by Victor Chemical Works, and they will consider all entries and determine the prize winners. By entering, entrants agree that the decision of the judges shall be final and binding. No entries will be returned. All entries become the property of Victor Chemical Works.
2. After you have filled in your answers neatly and clearly, fill out the official entry blank and mail the puzzle and entry blank to: "It Pays to See Victor" Contest, Post Office Box 5907, Chicago 77, Illinois.
3. All entries of solutions to the puzzle must be postmarked before midnight, December 15, 1959, and received before December 31, 1959.
4. Entries shall be limited to persons over 21 years of age, and who are residents of the United States, except employees of Victor Chemical Works, its advertising agency, and members of their families. Only one entry per person will be accepted.

5. The judges will select as prize winners those persons whose entries rank highest. They will select as the first prize winner, the entrant who submits the correct or most nearly correct solution. The clues Down numbered 26, 28, 34 and 42 must be answered correctly or the rest of the puzzle will not be judged. In case of ties, the ties will be resolved in favor of the entrant who submits the correct answer to Clue 6 Across, then Clue 13 Across, then Clue 28 Across, and so on until no ties remain. Should ties still exist, tied entrants will be required to complete in not more than 25 additional words the statement, "In the — industry, it pays to see Victor because . . .". Such statements will be judged on the basis of originality and aptness and duplicate prizes will be awarded in case of ties.
6. There are 50 prizes, as shown elsewhere in this announcement.
7. Contest is subject to all Federal, state and local regulations.
8. Winners will be notified by mail about March 1, 1960.





# from New York to Europe

## "IT PAYS TO SEE VICTOR"

● Let your imagination take wings. Imagine, for a moment, you're the winner of first prize in the new and exciting "It pays to see Victor" contest. Last call for London, Paris, Rome . . . and the 1960 Olympic games. So, climb aboard this gleaming Pan-American Jet Clipper (along with your partner), and zoom off into the wild blue.

● Though you leave your cares behind as you sweep silently over to Europe . . . the part Victor chemicals play in your life will be much in evidence, even "over there." Look around the cabin as you glide over the Atlantic. The aluminum you see is all bright dipped in a solution containing phosphoric acid. And aren't your stewardesses pleasant . . . personable . . . and lovely to look at! Part of the pleasure of their appearance lies in their uniforms—dyed to a beautiful shade in a bath using formic acid as an acidulant.

● After a few delightful days seeing the sights in London town, you hop over to Paris. Gay Paree—where cuisine is king! Even here, though, dishes have to be washed. And to help assure clean, sparkling results, chlorinated trisodium phosphate is in the dishwashing compound—just like "back home."

● Now, on to Rome and all the excitement and pageantry of the Olympics. Our athletes, with you cheering them on, are sure to pull down a record number of gold medals. One reason for their superiority is that their diet is rigidly watched . . . and well balanced. Tricalcium phosphate added to foods for mineral enrichment helps keep our men in the pink. Minor aches and pains are inevitable, of course. But they're quickly bandaged. Fortunately there's never a shortage of cotton when methyl parathion is the pesticide. PARA is sure death to boll weevils.

● We hope, when you get to Rome, you'll do as our "Romans" do—enjoy yourself and see in examples all around you that "It pays to see Victor."



**VICTOR**  
Dependable Name in  
*Chemicals*  
for 61 Years.

are paired with outer appearance views of each of 16 different combinations of standard shell and head components.

Component design features make up the third section of the manual. Features of standard gasket joint designs and combinations are shown and explained in enlarged detail. Gasket materials are handled similarly.

Economic and fundamental considerations are also briefly reviewed. A design check list includes corrosion, fouling factor, and other condensed data. Two data sheets suggest a communications basis for both bid inquiry and manufacturer's specifications.

Although the manual is based around manufacturer's own line, it doubtless will be of broader aid. The component letter code system should simplify communications.

(To obtain copy of P-K Heat Exchangers Manual No. 700-A, send letterhead request, giving your title and function, to The Patterson-Kelley Co., Inc., East Stroudsburg, Pa.)

#### Dust-gathering patents to be exploited

Purpose of recently organized corporation will be to find outlets for the development and manufacture of patents and processes which have never been exploited.

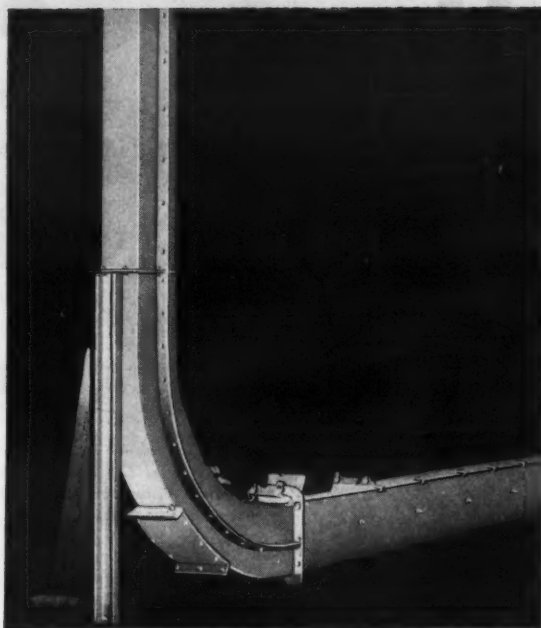
Corporate clients will be aided by the new firm in selling or licensing of patents and ideas developed by their research programs, but which do not have a natural outlet within their own operations.

Patents available for such exploitation represent an estimated several hundred million dollars expenditure in research and development.

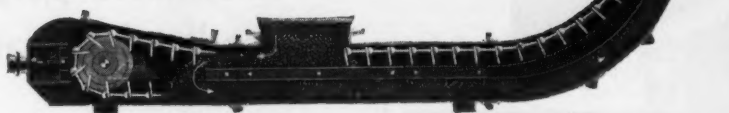
(Patent development is service offered by National Patent Development Corporation, 68 William St., New York 5, New York.)

For more information on product at left, specify 1746 . . . see information request blank opposite last page.

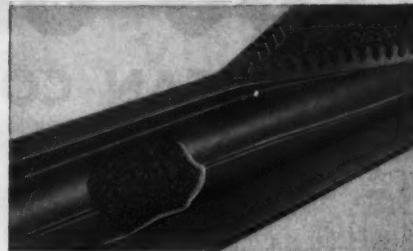
# STEPHENS-ADAMSON



REDLER® Conveyor-Elevator



BELT CONVEYOR SYSTEMS



ZIPPER® BELT CONVEYOR-ELEVATORS



CONTINUOUS WEIGHER

## SPEEDS EFFICIENCY...LOWERS COST IN CHEMICAL HANDLING

When you consult a conveyor manufacturer on a particular bulk materials handling problem, you do so because the consultant is a specialist in his phase of the business. But think of the advantages if that consultant were not only the manufacturer of a particular type of conveyor but a specialist in chemical handling systems.

STEPHENS-ADAMSON is just that kind of a consultant. The systems that S-A engineers are regularly designing and installing for the chemical processing industry are not based on a desire to sell a particular type of conveyor system—but the most efficient, profitable answer to the problem at hand. The reason is twofold—S-A's broad knowledge of the field and the fact that S-A makes not one, but several kinds of conveyor systems, some exclusive and patented by the company. Over 20,000 successful installations of the S-A Redler Conveyor-Elevator System alone, point up the breadth of S-A experience. Write today for full information.

### MORE S-A EQUIPMENT FOR PROFITABLE CHEMICAL HANDLING

- Box Car Unloaders
- SWIVELoader® Centrifugal Thrower Unit
- TELLEVEL® Bin Level Controls
- Bucket Elevators
- Ship Unloading Systems
- Car Pullers & Spotters



WRITE FOR  
REDLER  
CATALOG  
358



ENGINEERING DIVISION  
**STEPHENS-ADAMSON MFG. CO.**  
GENERAL OFFICE & MAIN PLANT, 11 RIDGEWAY AVENUE, AURORA, ILLINOIS

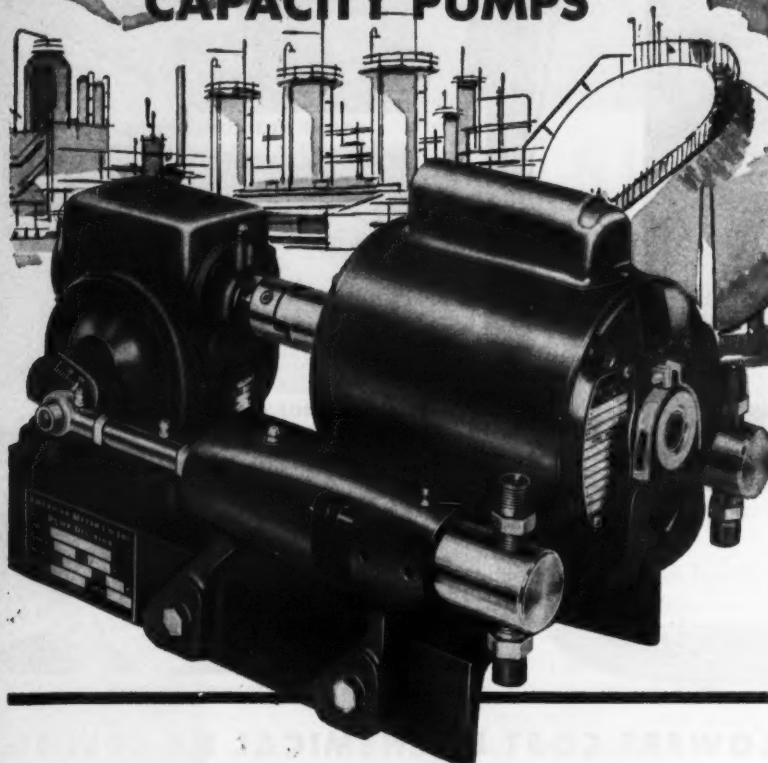
PLANTS LOCATED IN: LOS ANGELES, CALIFORNIA • CLARKSDALE, MISSISSIPPI  
BELLEVILLE, ONTARIO

Check 1747 opposite last page.



# 100 SERIES

## AMERICAN CONTROLLED CAPACITY PUMPS



### JOB ENGINEERED FOR LONG-TERM ACCURACY AND LOWEST MAINTENANCE COSTS

New American controlled capacity pumps are precision built to meet the needs of Chemical Processing, Refining and Boiler Feed applications. Quality construction assures highest accuracy in feeding precisely metered fluids or slurries into low or high pressure systems in virtually all desired ratios, with flow, temperature, pressure, conductivity, PH and other controlled process variables. Control may be manual or automatic—with electric, hydraulic or pneumatic systems.

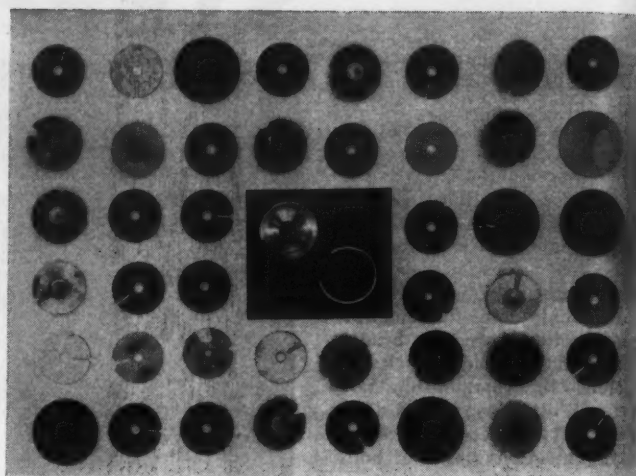
Newly designed models are available to handle a wide variety of "tough," corrosive and viscous materials.

Write today for full information on American's new controlled capacity pumps. They're sure to meet your fluid proportioning requirements.

**AMERICAN**  
METER COMPANY  
INCORPORATED ESTABLISHED 1921  
*pump division*  
13500 PHILMONT AVE., PHILADELPHIA 16, PENN.

Check 1748 opposite last page.

### IDEAS



Test discs made from 44 of materials evaluated for use in hot water meter. Chlorinated polyether plastic was selected from 75 products tested for application. Insert at center shows disassembled view of water meter chamber with polyether plastic part in place

## Of 75 materials tested, chlorinated polyether handles hot water best

Since being selected for disc and half-ball in 5000 meters for proportional pumping systems, the plastic has given excellent results over a two-year period

CARL MILLER, Physicist  
Economics Laboratory, Inc.  
St. Paul, Minnesota  
with CP Staff

**P**roblem: A meter used in system for dispensing a liquid formulation into rinse water for commercial dish-washing operations did not stand up satisfactorily. Disc and half-ball in meter could not withstand the continuous operation in hot water. It lasted only three days in some cases and several months in others.

The 5/8" disc-type hot water meter is used as part of proportional pumping system known as Drymaster. This

system continually dispenses a liquid chemical, called Rinse Dry, into hot water used for rinsing dishes. About 100 ppm of this chemical causes dishes to drain and dry quickly, spot free, without toweling.

Dispensing system is used by hotels, restaurants, hospitals, and homes. Since about 5000 such units were in use, excessive maintenance and increased service calls were a serious problem.

**Solution:** From the hundreds of materials available, Economics Laboratory narrowed field down to about 75 that might be suitable for the disc and half-ball in meter.

Among the 75 materials tested, some had a high cor-

rosion rate in hot water and were therefore unsatisfactory. One ceramic material could not be produced to as close tolerances as required. Another non-metallic product was too brittle. Some plastics were found to absorb water and not be dimensionally stable over long periods.

Another plastic seemed to work fairly well, but division slot on disc and half-ball made from it developed wear during a period of operation. Since it was much better than original material, it was used for production while further research was undertaken to find a still better material.

Some products posed a possible health problem so were ruled out. One plastic had a high frictional level. Others were abrasive or difficult to machine.

#### Injection Molded

Since machining is a relatively expensive operation, research was directed toward plastics that could be molded. From this work, a one-piece injection molded, filled Penton disc and half-ball was selected as best among those tested. Incorporation of a portion of graphite in the plastic improved wear properties and molding tolerances.

Penton is a thermoplastic polymer. It is a chlorinated polyether of high molecular weight, linear in nature, crystalline in character, and resistant to thermo degradation at molding temperatures. It has good mechanical properties and excellent resistance to a wide variety of corrosives.

**Results:** Hot water meters using the chlorinated polyether plastic have been in commercial service about two years with extremely favorable results. In view of this performance, a disc and half-ball used on a cold water meter was made of the polyether. It has been in production for nine months. Part has also given trouble-free service on this application.

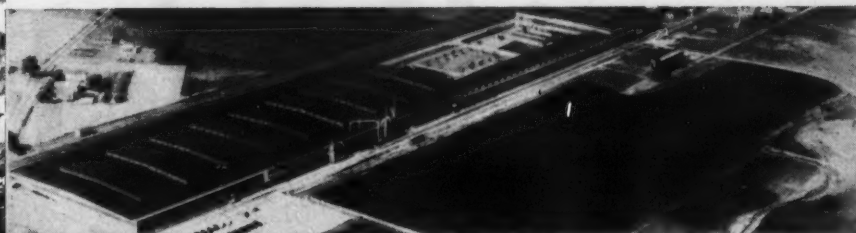
(Penton is product of Hercules Powder Co., 900 Market St., Wilmington 99, Del.)

Check 1749 opposite last page.

NOVEMBER 1959

# TIMBER!

Thousands of acres of excellent timberland brought Johns-Manville to VIRGINIA



**JOHNS-MANVILLE PLANT** at Jarratt, Virginia, is on a 200-acre site surrounded by the thousands of acres of pine forest owned by the company. Main plant building covers 5 acres, has productive capacity of 500,000 sq. ft. of  $\frac{1}{2}$  inch insulation board per day, plus many other types of allied building products.



**COMPREHENSIVE FORESTRY PROGRAM** provides constant supply of timber. In addition to its own extensive stands of Southern pine, the company buys from local farmers, and assists them in reforestation programs.



**MODERN EQUIPMENT** of every sort utilizes 47,000,000 kilowatt-hours of electricity annually. Nottoway River furnishes ample process water for two 500,000-gallon reservoir settling tanks. Plant employs 450 people.

"The healthy business climate that exists in the State of Virginia has been of great help to us, and we hope to participate in the industrial and economic development of Virginia for many years to come."



**A. R. Fisher**  
Chairman and President  
Johns-Manville Corporation

When laboratory experiments showed that a superior insulating board could be made from Southern pine, Johns-Manville initiated an exhaustive study of the many sites available. All factors considered, Jarratt, Virginia, proved to be the ideal location for economical plant operation.

Here, vast stands of pine, within 10 miles of the plant site, provide a perpetual supply of excellent wood fibre. Proximity of timber, and a climate that permits year 'round logging, enables the plant to carry only a minimum inventory of cut logs. Because all timber comes from the same area, it is uniform in its charac-

teristics and so helps assure unvarying high quality in finished products.

Moreover, this typical Virginia community offers dependable, conscientious labor, plenty of room for expansion, abundant water and electricity. The Johns-Manville plant is located near a junction of two major railroads and has excellent highway connections, all providing easy access to domestic markets and to the ice-free ports of Virginia for waterborne shipments.

If you're planning a new plant, let us tell you why so many companies are locating in Virginia. Phone, wire, write, or visit in complete confidence.

*Following are a few other outstanding industries that have located in VIRGINIA*

- Acme Visible Records, Inc.
- Reynolds Metals Company
- The Dow Chemical Company
- Sperry Piedmont Company
- The Babcock & Wilcox Company
- American Oil Company

*Let Them Tell You What Prompted Their Decisions To Locate Here.*

**C. M. Nicholson, Jr., Commissioner**  
Division of Industrial Development

Virginia Dept. of Conservation and Economic Development  
State Office Bldg., Richmond, Va. • Phone Milt'n 4-4111 Ext. 2255

*You, too, can find these... and many other great competitive advantages in*

**VIRGINIA**

Virginia's a wonderful place to play or work. Send for Free Vacation Guide Book.

Check 1750 opposite last page.

# DEHYDRATES

DAVISON SILICA GEL GIVES GREATEST PROTECTION

One cubic inch of Davison Silica Gel has an adsorptive surface of 90,000 square feet—an area larger than two city blocks! This capacity has made Davison Silica Gel the favored desiccant for air and gas dehydration and wherever rust, corrosion, or other moisture problems exist. For instance, Davison desiccants are used to protect tropical shipments, to clean and dehydrate air and natural gas—refrigeration sys-

tems—blast furnace gases—and in oxygen plants. Perhaps the application of a Davison desiccant to *your* moisture problems is in order. Write Department 37311 or call today for complete information.

DEPARTMENT 37311

**W.R. GRACE & CO.**  
DAVISON CHEMICAL DIVISION  
BALTIMORE 3, MARYLAND



Check 1751 opposite last page.

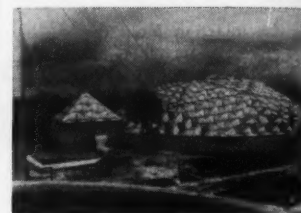
## IDEAS

### **H<sub>2</sub>S fumes trapped by Dacron baffle on sewage filter**

**Problem:** Hydrogen sulfide escaping from municipal sewage treatment plant in Sarasota, Florida, brought on a number of civic complaints and some litigation. The offensive and corrosive gas emanated from the plant's 10,000 sq ft trickling filter.

**Solution:** A tent-like structure made of treated Dacron polyester fiber was installed over the filter. The fabric weighs 3.4 ounces per sq yd and is woven close enough to trap the fumes.

A geodesic cover of hexagonal aluminum panels and stainless steel frames was constructed to hold the fabric



Geodesic cover built over sewage treatment plant's filter traps obnoxious hydrogen sulfide fumes. Suction fan (left) moves accumulated gas into tall stack at far left for eventual release to atmosphere

liner. The metal shields the fabric liner from direct rays of sun. Fabric, in turn, keeps corrosive atmosphere away from the metal.

Liner is suspended from the metal cover at 500 suspension points by 3½ ft lengths of Dacron rope. The dome measures 112 ft in diam and rises to 27 ft at peak. Unit's 47 separate panels weigh about 7 tons.

Entire installation was put up in less than a month. The supporting structure of panels and frames were anchored to 15 support brackets mounted on the existing concrete wall surrounding the filter bed. Seams on the 300-lb panels were left open to let air into the structure.

**Results:** The fabric baffle has solved the hydrogen sulfide air pollution problem and



has put an end to residents' complaints and legal actions. Fumes still rise from the filter bed, but instead of escaping out into the air, they strike the baffle and are trapped. A suction fan draws them back down to filter level, where they are funneled into and released through a 75-ft tall stack.

The baffle has also permitted the plant to discontinue use of pre-chlorination technique for odor control. Savings in chemicals are expected to gradually pay for the cost of the unit, which amounted to about \$42,000.

In use for considerably more than a year, the installation should last for at least 20 years. Close inspection of the fabric has revealed no signs of degradation.

Areas of application for similar baffles appear to be in containment of other objectionable fumes and for storage of bulk materials where conditioned atmospheres are required.

(Dacron polyester fiber is product of E. I. du Pont de Nemours & Company, Wilmington, Delaware.)

Check 1752 opposite last page.

#### **Phthalic anhydride plant uses fluid-bed process**

Fluid-bed process will be utilized at \$5 million phthalic anhydride plant being erected for Reichhold Chemicals, Inc., at Elizabeth, N.J. Scheduled to go on stream before year's end, plant will produce 30 million pounds annually, and can be expanded quickly to capacity of fifty million pounds.

Although fixed-bed process is more commonly used, manufacturer reports use of fluid-bed process will reduce engineering and operating costs while giving higher yields and quality product.

(Phthalic anhydride process was designed for Reichhold Chemicals, Inc., by Badger Manufacturing Company, 363 Third St., Cambridge 41, Massachusetts.)

Check 1753 opposite last page.



Chemico's modern research and development center is staffed and equipped to provide industry with a full range of bench scale and pilot scale development services, including:

- ★ Process development and evaluation
- ★ New process research
- ★ Process improvement
- ★ Efficiency improvement of unit operations
- ★ Development of new equipment and products

If an idea is economically sound and technically feasible, Chemico can put it into commercial operation in the shortest possible time. Each research contract is supervised by engineers and technicians familiar with industrial processes, equipment, and designs. Therefore, the transition to profitable commercial application is smooth and efficient. The client can be assured that Chemico will undertake such activities in the framework of a completely confidential relationship.

If you are interested in learning more about Chemico's research activities, please address your inquiries: Attn: TECHNICAL DIRECTOR, at the address below.

# RESEARCH

from an engineering point of view

## CHEMICO

CHEMICAL CONSTRUCTION CORPORATION  
West 43rd Street, New York 36, New York

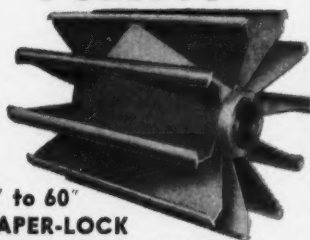
CHICAGO • DALLAS • HOUSTON • PORTLAND, ORE. • TORONTO • LONDON • PARIS • JOHANNESBURG • TOKYO

Check 1754 opposite last page.

# SH·H·H!

TURN QUIETLY TO PAGE 189

Use **VAN GORP**  
*Turn-Clean*  
**PULLEYS**



8" to 60"  
TAPER-LOCK  
VAN GORP Self-Cleaning PULLEYS  
**STOP BUILD UP**

Van Gorp Self-Cleaning Pulleys offer individual wing construction that prevents any material build-up between the belt and pulley. Self-cleaning cone design automatically discharges foreign material to the sides of the pulley. It is no longer necessary to spend valuable time cleaning material from belt or pulley. Van Gorp Pulleys stay clean and insure proper belt alignment. Reduce your maintenance costs! Be sure you specify Van Gorp TURN-CLEAN Pulleys with Dodge TAPER-LOCK bushings on all your conveyors or bucket elevators.

CATALOG OF OVER 3,000  
SIZES ON REQUEST

**Van Gorp Mfg. Inc.**  
PELLA, IOWA



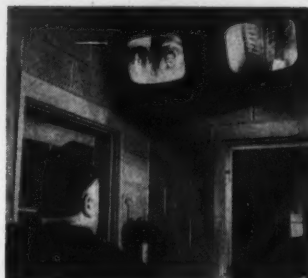
Check 1755 opposite last page.

## IDEAS

### Second refinery entrance remotely monitored via television

A closed-circuit television system, used by guards to observe entering personnel, permits some 150 employees to have more convenient access to their working places, at Gulf Oil Corporation's Girard Point refinery in Philadelphia, Pennsylvania.

Two TV cameras serve as remote eyes for auxiliary entrance 350' away from main gate house. Two monitors are used. One monitor shows split-screen image of worker's



Guard keeps tabs on personnel passing through auxiliary gate 350' away

face and badge as he enters. Other keeps him in sight while passing through turnstile in either direction.

(TV remote-gate monitor is development of General Precision Laboratory Incorporated, Subsidiary of General Precision Equipment Corporation, Pleasantville, N.Y.)

Check 1756 opposite last page.

### Monitor for air pollution utilizes Krypton-85 gas trapped in clathrate

Problem of air pollution may be speeded toward solution by development of device based on application of atomic research.

Instrument, which measures concentrations of non-radioactive gaseous contamination in air, consists of crystalline clathrate in which is trapped Krypton-85 gas.

Small amount of clathrate is packed in glass tube, and air drawn through tube, over



## STOPS LEAKS PERMANENTLY: prove it at our expense!

Use *Leak Lock* to seal thread and flange joints... to keep bolts, nuts and plugs from loosening under the most rigorous usage. It's been job-proved in thousands of applications to give these advantages...

- Withstands solvents that eat away other joint compounds.
- Remains flexible indefinitely... joints won't freeze.
- Gives a tight seal under a wide range of temperatures, pressures.
- Does not heat spontaneously.
- Is unaffected by oil, gasoline, refrigerants, most gases and chemicals.
- Makes work easier... flows on and stays where applied.



Approved by Underwriters' Laboratories for gas, oil, propane and butane equipment.

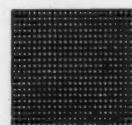
**FREE SAMPLE**—Leak Lock is available in handy tubes and in cans. Write on your letterhead for sample tube.

**HIGHSIDE CHEMICALS INCORPORATED**  
16 Colfax Avenue • Clifton, New Jersey

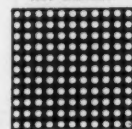
Check 1757 opposite last page.

## H & K Perforated Screens

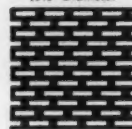
for  
Grading  
Sieving  
Dewatering  
Filtering  
Straining  
Sterilizing  
and Tote  
Baskets



.020" Diameter



.045" Diameter



.028" x .125" Slot



Find Nearest  
**H & K AGENT**  
on the  
"Yellow Pages"

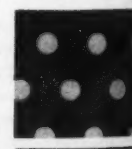
Listed Under  
"Perforated Metals"

Write for  
H & K  
General  
Catalog

H&K perforated screens are furnished, to customer order, with holes accurate and uniform in size, shape and spacing. The screen resists blinding as burr-free holes are slightly larger at the bottom. H&K perforated screens can be furnished with margins or unperforated areas in practically any material desired.

H&K specializes in the perforating of stainless steel, monel and other corrosion-resistant alloys.

Contact either H&K office or an H&K agent. Let us work with you on your perforated screen requirements.



Tapered Round  
Holes in Steel



No. 3  
Diagonal Slot

**Harrington & King**  
PERFORATING CO. INC.

Chicago Office and Warehouse New York Office and Warehouse  
5636 Fillmore St., Chicago 44 110 Liberty St., New York, N. Y.

Check 1758 opposite last page.

CHEMICAL PROCESSING

clathrate, for analysis. Contaminating material in sample reacts with clathrate, freeing Krypton-85 gas in amount proportional to concentration of contaminant. This gas is drawn into chamber containing Geiger tube which measures radioactivity due to Krypton-85.

Clathrate can be made to react with such common contaminants as  $O_3$ ,  $NO_2$ ,  $ClO_2$ , etc., singly or in combination.

Advantages of instrument are: safety—Krypton-85 is inert gas incapable of metabolism by body; sensitivities in parts per billion range; quick results; simplicity of operation; small size, and low cost.

(Air pollution monitor is development of Tracerlab, Inc., 1601 Trapelo Rd., Waltham 54, Massachusetts.)

Check 1759 opposite last page.



**Mobile sodium melting rig . . .**

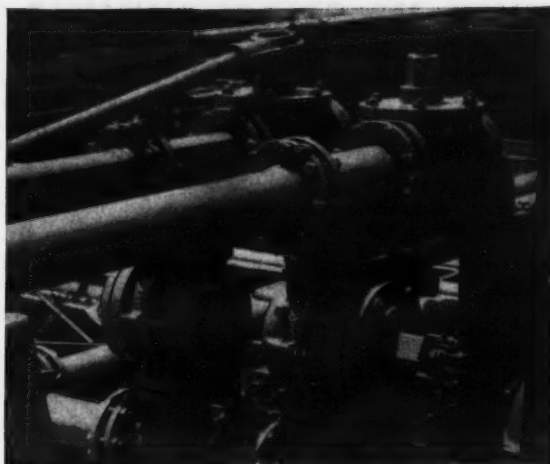
. . . can melt and pump 110 gph sodium. Using two electric heaters that can each handle a 55 gal drum of sodium, 350°F molten metal is fed by gravity to foil-insulated transfer tank beneath platform. Sodium is then pushed by nitrogen gas through filter tanks and on to point of use. All lines and equipment on rig are electrically heated. Unit is used at Atomics International for supplying sodium to test loops and sodium-cooled nuclear reactors being developed by the firm.

(Sodium melting rig was developed by engineers at Atomics International, a division of North American Aviation, Inc., P. O. Box 309, Canoga Park, Calif.)



**IN THE  
SPOTS THAT  
COUNT!**

**Goodyear specifies Homestead Valves for non-contamination of GR-S latex rubber**



Homestead lubricated plug valves handling latex rubber.

Through the round ports of Homestead Lubricated Plug Valves at Goodyear Tire and Rubber Company's synthetic rubber plant in Houston, Texas, flow dilute solutions of GR-S latex rubber at 80 p.s.i. and 100° F.

Fluid solutions never lodge and build up in the line since Homestead Round Port Valves provide full circular opening through plug and body of the valve—same size as the pipe they serve.

Controlled pressurized lubrication plus extremely close tolerances between plug and body assure lubrication of all sealing surfaces without contamination of line fluids.

Write for complete details on low first cost, low maintenance, Homestead Valves in our catalog 39-1.



☐ Please send me catalog and prices on Homestead Lubricated Plug Valves.

Name.....Title.....

Company.....

Address.....

City.....Zone.....State.....



**HOMESTEAD VALVE MANUFACTURING COMPANY**  
P. O. Box 140, Coraopolis, Pennsylvania

Check 1760 opposite last page.



## IDEAS

### Isotope, X-ray research to be conducted in new center

Completely equipped non-government installation for processing, storing, and encapsulation of radioisotopes; and for conducting research in gamma and X-ray radiation, was recently dedicated.

The research center is equipped for quick processing



Transfer containers of heavy lead are lined up to receive small stainless-steel capsules of high-level radioisotopes in test center. Technician works behind liquid-filled viewing window and handles isotopes by remote control with master-slave manipulators.

and packaging of almost any radioisotope, in quantities up to one million curies of Cobalt-60 or its equivalent.

(Isotope and radiation research center is operated by Picker X-Ray Corporation, Affiliate of C.I.T. Financial Corporation, 23 S. Broadway, White Plains, N. Y.)

Spray dried powder and how to form it into agglomerated clusters for easy reconstitution is topic of four-page booklet. Bul 540—Dairy Equipment Division, Blaw-Knox Company, Mora, Minnesota.

Check 1762 opposite last page.

Bibliography of selected literature on reprocessing irradiated fission reactor fuel and breeding materials has been prepared by the AEC. The 118-page listing may be obtained for \$2.75 from the office of Technical Services, U. S. Department of Commerce, Washington 25, D.C.

CHEMICAL PROCESSING



## THE PROPER WIND IN SPIRAL-WOUND

It's the precise control of gasket densities for every stage in the pressure series that makes each Flexitallic Gasket right for a given flange.

Flexitallic Spiral-Wound Gaskets are engineered to meet extreme conditions encountered in keeping with the pressure/temperature rating for the specified assembly.

These controls mean that a Flexitallic Gasket, designed for an extreme pressure/temperature rating, is never so soft that it crushes under the specified load, and never so hard that it resists

the compression necessary for a specified seal.

For predictable performance throughout all pressure/temperature ratings, look for Flexitallic Blue, the blue dye in the Canadian asbestos filler. It identifies the original Spiral-Wound Gasket construction.

**FLEXITALLIC GASKET CO.**  
8th & Bailey Sts. Camden 2, N.J.

*Flexitallic*  
**SPIRAL-WOUND GASKETS**

FOR PIPE FLANGES, PRESSURE VESSELS AND PROCESS EQUIPMENT

\*Flexitallic is a registered tradename. No one else can make a Flexitallic Gasket. Look for *Flexitallic Blue* — it's our exclusive blue-dyed Canadian asbestos filler.

Check 1761 opposite last page.

# 'Instant blending' of heavy, light liquids to controlled viscosity

**In-line viscometer regulates flow-controller on cutter stock to achieve target viscosity**

**KARL ROBE**, Editor West  
with **HAYDEN H. JONES JR.**, Acting Bulk Transfer Supervisor  
Union Oil Co., Wilmington, California

**P**roblem: Batch mixing and manual blending of dark oil products to specified viscosities demanded constant attention in bulk handling department at the Wilmington, Calif., refinery of Union Oil Co. Time lag incurred waiting for laboratory viscosity determinations often interfered with efficient control and immediate correction.

Department blends light cutter stock into heavy residual fuel grades to specified viscosities. Blends were made by pumping cutter stock into partially filled heavy oil tanks, with constant recirculation pumping to mix the fractions. Lab viscosity tests were made and more light stock added until proper end viscosity was obtained.

**Solution:** Batch viscosity control methods have given way to a trouble-free continuous viscometer control.

Sample stream is diverted to viscometer, and pumped at constant rate (64 cc's per minute) through 24' SS coil immersed in constant-temp oil bath. Close temperature control of sample is maintained to within 1/100°F by electronic system and resistance thermometer. A precision-gear, positive-displacement pump closely controls sample flow rate. Contact yards of instrument are stainless steel.

Sample then feeds into bottom of capillary tube, which is vented to atmosphere. Pressure drop across capillary is measured by pressure trans-

mitter whose output signal is 3 to 15 psi. This signal is continuously recorded and operates throttling control valves on the cutter oil line, increasing cutter oil flow if product viscosity is high or throttling down if product viscosity drops too low.

Principle on which instrument operates is simple — at constant flow and temperature, viscosity varies directly as pressure drop across the capillary.

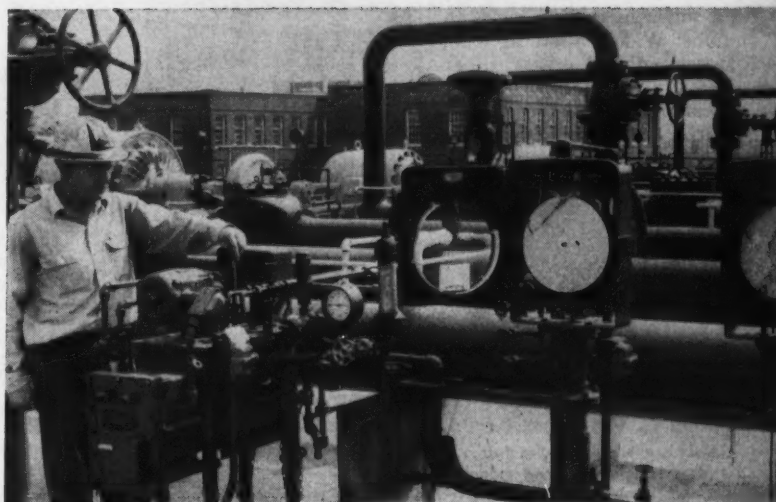
**Results:** Viscosity control permits automatic blending to replace batch mixing. Both oils are now pumped through a common line and mixed instantly and accurately by pumping action in a single operation. Blending can be done at rate of 5000 barrels/hr. A wide range of finished fuels can be furnished to specification on much shorter notice than formerly.

Mixing and blending time has been cut to 60% of former time and continuous record of quality and quantity of blended product is furnished. Two mixing tanks have been eliminated, as well as need for many of former finished-oil storage tanks.

Lab personnel and facilities are freed from time-consuming routine tests.

(Hallikainen Model 1077 viscometer is product of Hallikainen Instruments, 1341 Seventh Street, Berkeley 10, California.)

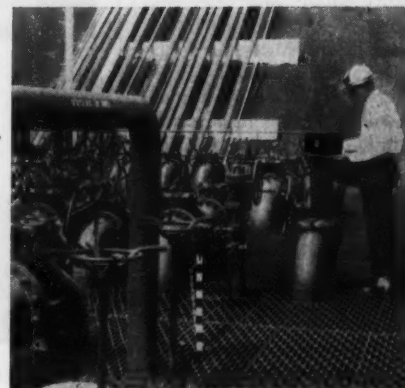
Check 1763 opposite last page.



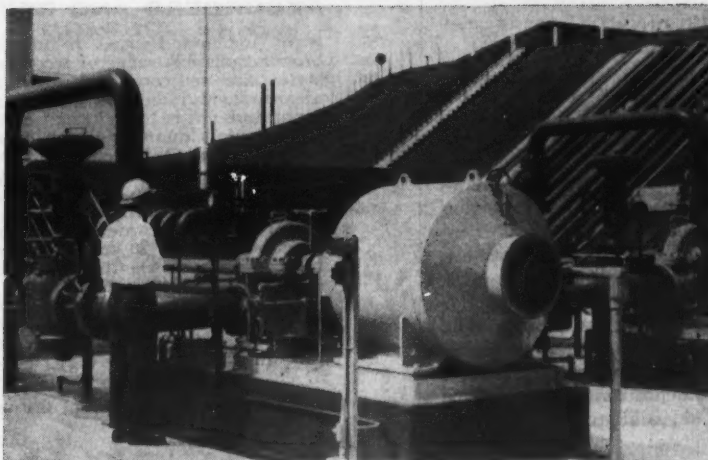
Photos by CP Staff

Operator is changing capillary tube so viscometer will handle a new range of viscosities. Maximum viscosity handled in Union Oil instruments is 2500 cps

Control valves are located under this grating on incoming lines from uphill tanks. Valve system permits blending of almost any combination of fuels



Pump in foreground automatically blends cutter stock and heavy fractions. Pneumatically actuated valve at left is regulated by flow controller to maintain desired flow rate



## INSTRUMENTS & LAB

**High-shear disperser,  
emulsifier available  
in pilot scale**

Continuous unit available,  
corrosion resistant

**Uses:** Dispersions of liquids and solids in liquids, gases in liquids. Widely used in food, plastics, rubber, grease, other fields.

**Features:** Available in two models; one, direct drive; sec-



Mixer is available in direct-drive and variable-speed drive models

ond, variable-speed drive. Capacity about one fifth that of smallest production model.

**Description:** Material to be dispersed is supplied under pressure to mixing head. High-speed action of surfaces accomplishes desired result.

(Model 4M mixer is supplied by E. T. Oakes Corp., Islip, New York.)

Check 1764 opposite last page.

**Long-lived components  
compactly packaged  
in carrier system**

Instrumentation needs met  
for variety of systems

**Uses:** Provides method of conditioning output of reluctance transducers for recording or control applications. Also converts physical quantity into its electrical analog suitable for recording.

**Features:** Conservatively rated circuitry and high-density component packaging of passive elements extends system life and conserves space. Meets instrumentation requirements ranging from two-channel configuration to multi-channel system featuring



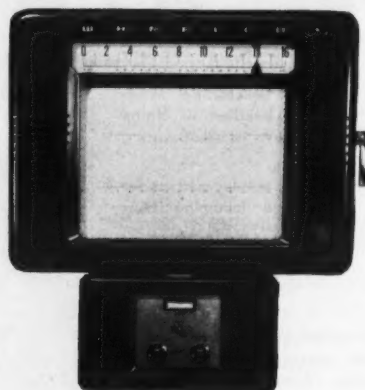
# Often first... but always the finest

**Wheelco offers advanced-design recorders,  
controllers, and indicators with field-proved  
features for every processing need**

Try as we may, Wheelco can't always be first with every development in processing instrumentation. But you can be sure of one thing — that every Wheelco development is backed by painstaking development work and extensive field testing, based on a quarter-century of experience gained in working on every type of processing problem.

Wheelco leadership has asserted itself in recorder-controller developments that include: constant voltage source standard at no extra cost, control forms with exclusive magnetic modulators, and plug-in components for simple inspection and maintenance. Wheelco also has pioneered gas chromatography systems offering a choice of tritium, strontium 90, or radium detectors.

These are all practical, workable developments — as sound in application as they are advanced in theory. For more details on any of the instruments outlined below, contact your nearby Wheelco instrument field engineer or write Wheelco direct. Ask for new Condensed Catalog F-5633-3.



SERIES 8000

## RECORDERS AND RECORDER-CONTROLLERS

Strip and round chart recorders and recorder-controllers cover the broadest possible range of recording and controlling applications. Both styles are self-contained, null-balancing electronic instruments for measurement, indication, control, and permanent recording of temperatures and (with transducers) other variables including speed, strain, pH, etc. Any quantity that can be resolved into electrical systems can be handled on Wheelco recorders and recorder-controllers.

Wheelco multipoint recorders handle up to 24 points at speeds from 3 to 24 inches per hour. Multibank (scanner) setups permit recording 144 or more points.

Round chart recorders and recorder-controllers are available with pen speeds of 1, 4, or 20 seconds. Chart is 12 in. diameter and has a calibrated width of 4 1/2 in. Instrument accuracy is  $\pm 1/4$  of 1% for all scale spans of pyrometric range.

The three-function control form based on Wheelco's exclusive magnetic modulator, shown with the strip chart recorder, provides proportional reset and rate action and is available in current output, position, and duration types for either strip or round chart units.

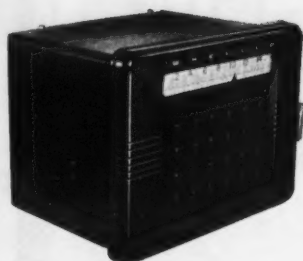
See WHEELCO at the Chemical Industry Exposition Booth 395.

SERIES 2000





# in process instrumentation



SERIES 9000



SERIES 400



SERIES 3000

## INDICATING CONTROLLERS AND INDICATORS

Wheelco indicating controllers and indicators are the finest available anywhere and offer a wide range of choices enabling the best instrument to be selected for the specific process. The 400 Series millivoltmeter controllers, for example, are available in a choice of six different control forms to provide a perfect match with the process. In addition, only Wheelco offers 3-function control on a relatively low-cost millivoltmeter controller.

Circular scale indicating controllers have a large, bold, distant-reading scale and can use thermocouples, radiation pyrometers, and transducers as sensing elements. Wheelco 9000 Series multistat indicators enable temperatures or other readings to be taken at as many as 108 stations. To take readings at more stations requires additional switch cabinets only.

## GAS CHROMATOGRAPHY

Three types of detectors—tritium, strontium 90, and radium—are available in either the Model 10 laboratory version for single or dual operation or the Model 20, a compact, portable unit. Both models can use either capillary or packed columns.

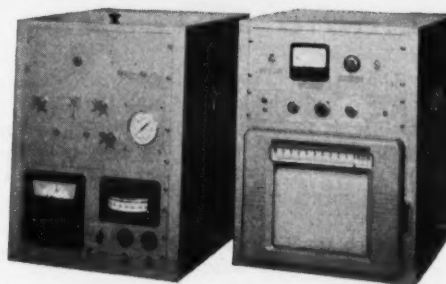
Newest addition to the line is the tritium detector for applications to 225°C that offers greater base line sensitivity due to reduced base line noise. It is only one-third as noisy as strontium 90 and one-thirtieth as noisy as radium. This detector design offers the ultimate in simplicity and ease of cleanup.

Wheelco ionization detection systems are offered with electronic integrator and automatic readout as optional equipment. With this added equipment analysis can be handled quickly and accurately by technicians who do not require special training.

Both models of Wheelco units come completely packaged, ready for immediate operation. Their modular, unitized construction makes all principal components readily accessible, facilitates modifications and adaptations.



MODEL 10



MODEL 20

## CONTROL CENTERS

Wheelco-designed and built control centers are available for every process control requirement. They may incorporate various combinations of instruments shown on these pages as well as various others in the Wheelco line. Because control centers are furnished as prewired, prefabricated units, installation time and costs are materially reduced and fewer problems are encountered in putting processes on the line.

automatic calibration, zero suppression, adjustable linearity, multiple outputs, etc.

**Description:** With solid-state demodulator circuitry, amplitude-modulated carrier system provides ultra-stable 3-kc transducer excitation at 20 volts rms.

Series injection electrical calibration manually, automatically or sequentially is feature of unit. Options of coarse and fine control are provided by range and balance panel.

Basic components of system are Series 1-3000 oscillators, Series 2-3000 demodulators, and manufacturer's line of reluctance transducers.

Functional controls are logically grouped so system may be operated by personnel with minimum instruction. Latching front-panel covers prevent accidental misadjustment of controls and improve appearance.

(Series 3000 carriers are manufactured by Wiancko Engineering Company, 255 N. Halstead, Pasadena, Calif.)

Check 1766 opposite last page.

## Six recorder-controllers replaced by combination

**Uses:** High-performance recording-controlling installations.

**Features:** Unit is capable of replacing up to six individual recording-controlling units, reducing initial costs, conserving panel space, and offering increased flexibility. It operates from either one or two thermocouples or other inputs per point.

**Description:** Consisting of multipoint recorder and controller, the combination controls up to six points and records up to 24 points.

Both on-off and proportional electric control are available, or pneumatic control may be supplied by use of electro-pneumatic converters.

(Combination recorder-controller is development of Daystrom-Weston Industrial Division, Daystrom, Incorporated, Murray Hill, N.J.)

Check 1767 opposite last page.

# BARBER-COLMAN COMPANY

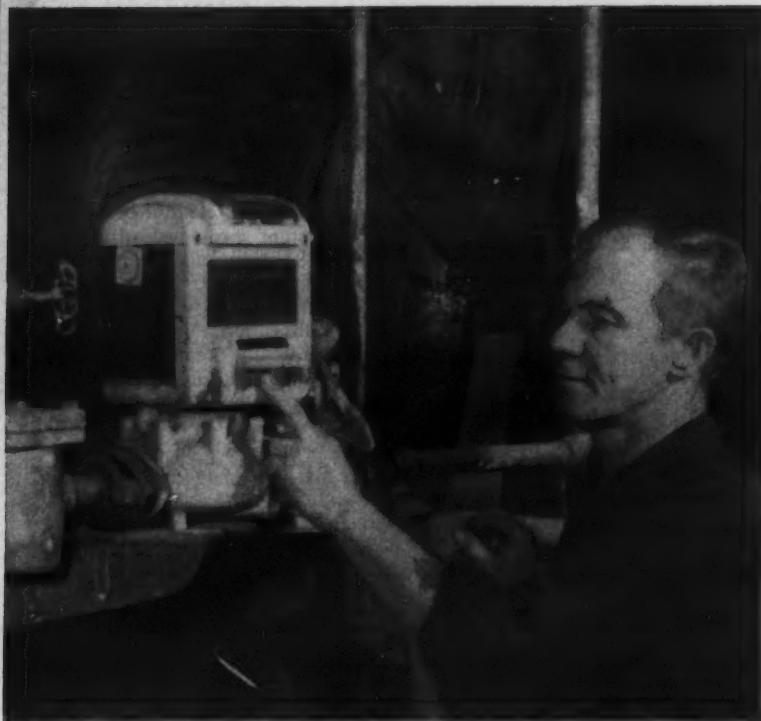
Dept. W, 1520 Rock Street, Rockford, Illinois, U.S.A.

BARBER-COLMAN of CANADA, Ltd. Dept. L, Toronto

Export Agent: Ad Auriamo, Inc., New York

Industrial Instruments • Aircraft Controls • Electrical Components • Small Motors • Automatic Controls • Air Distribution  
Products • Overdoors and Operators • Molded Products • Metal Cutting Tools • Machine Tools • Textile Machinery

Check 1765 opposite last page



## HOW BIRGE WALLPAPERS GET Accurate Color Control WITH NEPTUNE LIQUID METERS

Color control in fine wallpaper made by The Birge Co., Inc., Buffalo, N. Y. depends on adding precise amounts of water to the basic stains and pigments as they are ground in the ball mills. Birge formerly used calibrated pails, taking 20 minutes to feed 500 pounds of water to the big mills. Whenever Birge's meticulous laboratory spotted miscounts, they had to be corrected by time-consuming additions of pigments or water, followed by the expense of a second lab test.

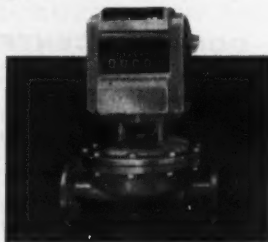
Now a Neptune Auto-Stop meter does the work...without miscounts. In less than 10 seconds the operator sets the meter for the quantity required. The meter shuts off automatically at the exact pound. Result: viscosity and color that's perfect, batch after batch.

Neptune meters can help you too. See our pages in CEC, and send for Metering Data Bulletin 566 HP

### NEW... STAINLESS STEEL METER

For corrosive liquid batching, transfer, cost accounting, processing, etc. Only two moving parts contact the liquid. Gear train outside the measuring chamber.

Ask for facts.



**NEPTUNE METER COMPANY**  
19 West 50th Street • New York 20, N.Y.

Branches in: ATLANTA • BOSTON • CHICAGO • DALLAS  
DENVER • LOS ANGELES • LOUISVILLE • NO. KANSAS CITY, MO.  
PHILADELPHIA • PORTLAND, ORE. • SAN FRANCISCO (Millbrae)  
In Canada: TORONTO 14, QNT.

**neptune**

Check 1768 opposite last page.

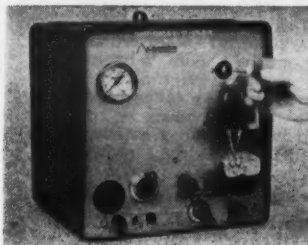
## INSTRUMENTS & LAB

### Compact chromatograph has high performance, wide temp range

**Uses:** Chromatographic separation and identification of gases or liquids.

**Features:** Compact instrument is designed for wide temperature range operation, between ambient and 2500°C, with temperatures to 350°C at a small increase in price.

**Description:** Detector is a shielded, semi-flow type using high-resistance filaments to achieve high sensitivity and rapid response characteristics while maintaining very low noise level. All piping in contact with sample is stainless steel. Electronic proportional



Compact unit handles material over temperature range from ambient to 250°C

temperature controller has set-point reproducibility to 1/2000 of span. Unit is 13 1/4" high x 12" wide x 13 1/4" deep.

(Model 15 gas chromatograph is a product of Loenco, 237 N. Fair Oaks, Pasadena, Calif.)

Check 1769 opposite last page.

### Use carbon-back paper on inkless recorder

**Uses:** Provides permanent, inkless record for all sensing devices.

**Features:** Unit is completely dependable in ambient temperature range of -40 to 160°F; and, as temperature recorder, has indicating range of -40 to 550°F. Accommodates all standard charts, and functions as portable, wall or panel unit.

**Description:** Produces permanent record without blotting in rough service and under extreme temperatures —

## Outstanding Accuracy PALMER Dial Thermometer



MODEL  
1035

FITS ALL BI-METALLIC WELLS

FULL 3 1/2"  
DIAL FACE

Check these functional features

- Direct-drive Bourdon Coil with a filled system for longer lasting accuracy.
- Stem can be placed at any desired angle and case can be rotated to most readable position.
- External calibration for zero setting.
- Unaffected by stem alignment.
- Accurate to one scale division.
- No sticking at any temperature.
- Non-corrosive case.

**PALMER**  
**THERMOMETERS, INC.**

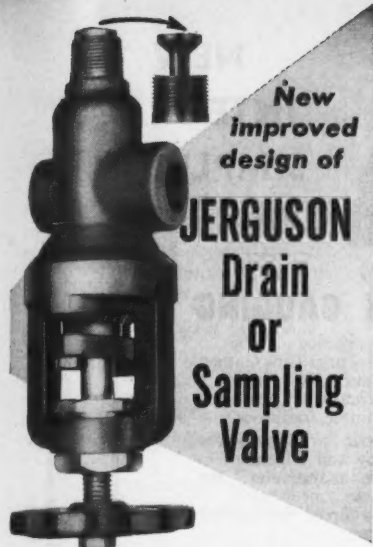
Mfrs. of Industrial Laboratory,  
Recording and Dial Thermometers  
2515 Norwood Ave., Cincinnati 12, O.

Check 1770 opposite last page.

CHEMICAL PROCESSING



## INSTRUMENTS & LAB



**Completely self-draining valve features freeze-proof outside screw and yoke bolted bonnet; perfect alignment**

The newly improved design of the Jerguson No. 23 Drain or Sampling Valve uses a special-type bolted bonnet which assures perfect alignment and freeze-proof action.

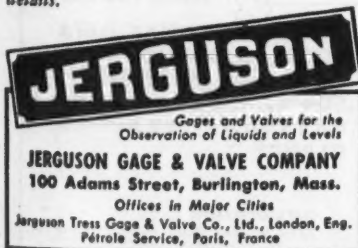
**Self-Draining:** Valve stem seats on outside of valve body inlet; no liquid remains in nipple or valve.

**New OS&Y Construction:** Built for corrosive conditions where inside threads cannot be tolerated. Simplified Outside Screw and Yoke Bolted Bonnet... forged yoke supports stem away from valve body; separate forged gland-follower bears directly on packing, entirely independent of yoke.

**Perfect Alignment; No Freezing:** Design assures perfect alignment of valve, and prevents freezing by allowing stem to work freely at all times. Operates in normal direction with left-hand thread on stem.

**Sizes; Pressures:** Popular  $\frac{3}{4}$ " x  $\frac{3}{4}$ " size for 4000 lbs. @ 100° F. is standard with  $\frac{1}{2}$ " plugged "steaming out" or purge connection. Other sizes: 1 x 1",  $1\frac{1}{2}$  x  $1\frac{1}{2}$ ", 2 x 2". Many optional features.

Write for data unit and complete details.



See Booths 1211-1213, Chemical Show

Check 1771 opposite last page.

NOVEMBER 1959

with low maintenance.

In self-contained model, two mercury batteries energize transistor oscillator to produce electric writing on carbon-backed paper. A transistor power supply emits very narrow pulse every 0.01 second. Output pulse in transformer secondary causes carbon-backed paper to conduct current and make black trace on paper.

Mercury batteries can be replaced with AC 115v power supply and chart-driven electrically instead of mechanically where facilities permit.

(Electric Graph Line recorder is product of The Electric Auto-Lite Co., Toledo 1, O.)

Check 1772 opposite last page.

### Dual-range Indicator readable within 1°

**Uses:** Indicating temperatures.

**Features:** Dual-range precision indicator has low range of -60° to +140°F, and high range of 0° to +500°F. Readability on low range is within 1°F.

**Description:** Similar to manufacturer's single- and multi-channel indicators, this model is portable, battery operated, and direct reading.

It has recorder jack in rear for use with standard industrial 50-millivolt instrument when recording. Measuring 7 x 10 x  $5\frac{1}{2}$ ", it may be removed from case and mounted on rack.

(PI-3 temperature indicator is development of Arthur C. Ruge Associates, Inc., Hudson, N.H.)

Check 1773 opposite last page.

### NEXT MONTH

Control of fluid catalytic cracking process and alkylation unit at Clark Oil and Refining Co. is accurate and dependable thanks to the combination of electronic and electrohydraulic instrumentation. For details on this increasingly important control method see this section next month.

## TORTURED WITH WATER PROBLEMS?

**CEC Moisture Monitors detect 1 part per million**

Our complete line of Moisture Monitors accurately measure water in gas or liquid streams, furnace atmospheres, dry-gas containers. Available in



laboratory, high-pressure, and process versions, these instruments can precisely determine water concen-



trations of less than one part per million for either gas or liquid applications. They can also be used to actuate automatic process controllers. For more information, call your local CEC Sales & Service Office, or write for the new Moisture Measurement folder CEC 1851-X7 containing brochures on all CEC Moisture Monitors.

Analytical & Control Instrument Division

**CEC**

CONSOLIDATED ELECTRODYNAMICS / 360 sierra wood villa, pasadena, california



Check 1774 opposite last page.



# New MARSH "Master-Test" SERIES

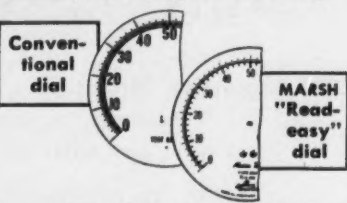
Twin-tip pointer enables observer to read "dead-on" by lining up twin tips like gun sight.



Mirror dial also insures accurate "dead-on" reading.



"Non-parallel" dial has Plexiglas insert that assures accurate reading even when read at angle.



New "Read-easy" dial (patent pending), as illustrated above, assures reading accuracy in keeping with indicating accuracy. Also note three advanced means of reading available in all "Master-test" gauges: twin-tip pointer, mirror dial, and "non-parallel" dial as shown opposite.

Sizes 4 1/4", 6", 8". All standard pressure ranges 0-15 psi to 0-30,000 psi, vacuum and compound.

Ask for new 20 page bulletin covering all details  
MARSH INSTRUMENT CO., Dept. Z, Skokie, Ill.  
Division of Colorado Oil and Gas Corporation  
Marsh Instrument & Valve Co., (Canada) Ltd.  
8407 103rd St., Edmonton, Alberta, Canada  
Houston Branch Plant, 1121 Rothwell St.,  
Sect. 15, Houston, Texas

Check 1775 opposite last page.

## TANK-METER

FOR MEASURING TANK CONTENTS  
ANY DISTANCE AWAY

**TANKS MAY BE...**

- BURIED OR ELEVATED
- OPEN • CLOSED • VENTED
- UNDER PRESSURE • UNDER VACUUM
- UNDER PRESSURE AND VACUUM

**ACCURATE • RELIABLE • DURABLE**

Also gauges for:

Barometric Pressure (Mercury Column)  
Absolute Pressure (Mercury Column)  
Pressure and Vacuum  
Differential Pressure  
Inclined Manometers  
for draft, pressure or  
differential pressure.

SEND FOR BULLETINS

**ANY  
LIQUID**

**488 GETTY AVE.  
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**SINCE 1896**

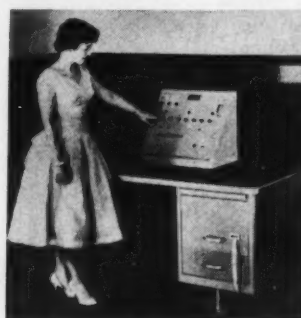
Check 1776 opposite last page.

## INSTRUMENTS & LAB

**Eight remote stations  
served automatically  
by central computer**

Uses: Automatic communication of programs and computer results between central computer and up to eight remote locations.

Features: Eliminates scheduling problems and inefficiencies where several departments use central computer.



Remote-station console (above) is part of system for automatic communication of computer programs and results between central computer and remote stations. Control panel (center) is used to request service from computer. Indicators show status of request. Five- or seven-hole code data are transmitted by tape reader to computer, and results received on punch tape (lower right)

System provides individual access from remote locations and over-ride control by computer manager.

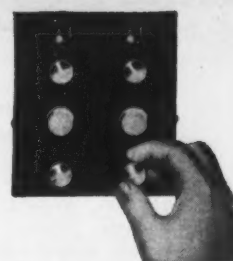
Description: Input control unit receives data from photo-electric tape readers at remote stations. It records data on magnetic tape and releases control to central computer.

Central computer reads program into its internal storage for computation, while input control unit is freed for new service.

As program is processed by computer, results are recorded on output magnetic tape. Output control unit transmits results to proper remote station where they are punched on Teletype 60 character/second paper-tape punch. Computer is freed for new computation.

Choice of codes and input/output media are available.

Complete system consists of



## NEW INTEGRAL SIMPLICITY

### in continuous, remote TANK GAUGING

Simple in principle and practice... the new Meriam Continuous-Purge Tank Gauge. Integral easy-reading purge-flow indicator and convenient front-panel operating knobs make operation simple, foolproof.

Based upon manometric principles, the Gauge has the accuracy and dependability inherent in the manometer. No calibration troubles, no mechanical difficulties. Indication is direct, dependable and continuous.

Rugged enough for outdoor use, the Gauge can also be panel mounted anywhere up to 600 feet from the tank. It is available in single- and multiple-tube models in ranges up to 60 inches, with a choice of indicating fluids to permit selection for sensitivity and readable accuracy required.

WRITE FOR BULLETIN L-10

**The MERIAM Instrument Company**  
10920 Madison Avenue, Cleveland 2, Ohio

U.S.A. 1958

Check 1777 opposite last page.

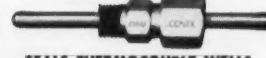
## conax® PACKING GLANDS USING "SOFT" SEALANTS

### UNIVERSAL

Any bore size available  
from 1/16" to 3/4" diameter



SEALS WIRES



SEALS THERMOCOUPLE WELLS



SEALS TUBE ENDS

CONAX Packing Glands compress the "soft" sealant against any kind of tube, rod or wire with the following advantages:—

- Temperature range: -300°F to +1850°F
- Pressure range: vacuum to 7500 psi.
- Non-destructive to sealed element
- Completely adjustable immersion
- Stainless steel construction
- Available "soft" sealants: Neoprene, Teflon, Lava and Asbestos-Graphite
- Delivery from stock



**WRITE FOR CONAX DATA  
BOOK SHOWING COMPLETE  
LINE OF THERMO-  
COUPLE ASSEMBLIES AND  
PRESSURE SEALING  
GLANDS**

**conax**

corporation  
2314 Walden Ave., Buffalo 25, N. Y.

Check 1778 opposite last page.

CHEMICAL PROCESSING

input control unit, output control unit, and remote-station consoles.

(Multiplexer 1010 data-processing system is development of Vitro Laboratories, division of Vitro Corporation of America, 200 Pleasant Valley Way, West Orange, N.J.)

Check 1779 opposite last page.

### Low-temperature liquids measured by thermistor

**Uses:** Measuring and controlling of low-temperature liquids.

**Features:** Thermistors, bead- and probe-type, exhibit high stability, high sensitivity, and quick response, according to manufacturer. Glass-enclosed thermistors are free of electrolytic action.

**Description:** Beads (05A1 and 05A2) are 0.43" in diameter, while probes (05A3 and 05A4) are 1/2 and 2" long. Direct readings can be obtained with standard laboratory equipment.

Resistance at  $-195.8^{\circ}\text{C}$  equals 300,000 ohms plus or minus 50%; time constant in liquid nitrogen is less than one second; dissipation constant at  $25^{\circ}\text{C}$  is 1 mw/ $^{\circ}\text{C}$  in still air, 5 mw/ $^{\circ}\text{C}$  in still water; temperature coefficient at  $-195.8^{\circ}\text{C}$  is approximately  $-20\%/^{\circ}\text{C}$ .

(Veco lox thermistors are manufactured by Victory Engineering Corp., 511 Springfield Rd., Union, N. J.)

Check 1780 opposite last page.



"It's really not an experiment. I'm making some stew for lunch."

Many new techniques and methods of telemetering are available today as a result of rapid advances in the science of data processing and transmission. Today, more than ever, selection of the telemetering system best suited to a particular application requires careful study of many alternatives to insure maximum effectiveness at minimum cost.

The Bristol Company offers *all* the major types of industrial telemetering systems, as outlined in the table herewith. For some applications, of course, certain features of one system may be combined with another, allowing great flexibility in tailoring a system to your application.

The complete line of Bristol industrial telemetering instruments embodies over 45 years' experience in this field. Bristol engineers are always ready to recommend telemetering instruments to solve your particular problems or to work closely with your own engineers in the design of a complete telemetering system to your requirements.

For further information, write: The Bristol Company, 141 Bristol Road, Waterbury 20, Connecticut.

9.6

## TIPS ON INDUSTRIAL TELEMETERING

*for pipe lines, utilities, and process industries*

TYPE	OFFERED BY BRISTOL	SIMPLIFIED BLOCK DIAGRAM	ADVANTAGES AND LIMITATIONS	MAJOR USES
IMPULSE DURATION	Metameter*		Simple electro-mechanical device. Will transmit over wire circuit, carrier or microwave links. Offered in 60, 15, 5 or 2 second impulse cycles.	For analog transmission of all measurands.
VOLTAGE	Thermoverters* & Dynamaster.* D-C Transmission  Differential Transformer Transmitter & Dynamaster. A-C Transmission	 	<p>Instantaneous transmission. Limited to full metallic circuits of 2000 ohms (2 wires) free of parasitic currents.</p> <p>Instantaneous transmission. Limited to full metallic circuits. (3 wire.) Can operate into electronic control directly.</p>	<p>For analog transmission of electrical quantities.</p> <p>For analog transmission of mechanical measurands.</p>
FREQUENCY	Frequency Type Transmitter & Receiver with or without Audio Tone. (RFL) Model with Dynamaster End Device		Practically continuous. For millivolt inputs or measurand to millivolt pick-ups. Will operate over wire circuits, carrier or microwave radio links.	Primarily for transmission of electrical measurands but may be adapted to non-electrical quantities where high speed transmission desired.
PULSE COUNT	Transmitter — Contact Making Device. Receiver — Relay Operated Magnetic Counter or Running Count Recorder		Simple. Will transmit over wire circuit, carrier or microwave link.	Primarily for total flow transmission. Not used for instantaneous flow.
POSITION	Dynamaster Resistance Thermometer System		Instantaneous Transmission. Requires 3 wire metallic circuit not exceeding 1500 feet.	Temperature measurements.
PNEUMATIC	Metagraphic System. Metavane* System		Limited to 1000 feet of 1/4" tubing. Can operate into pneumatic control directly.	For non-electrical quantities where pneumatic transmission desired.
DIGITAL	Bristol Servo Transducer with Westinghouse, G. E., or Union Switch & Signal Pulse Code System		For transmission over wire circuits, carrier or microwave.	For digital transmission of all measurands, especially where pulse code supervisory control is available. Direct print-out of readings.

\*T.M. Reg. U.S. Pat. Off. Write for technical information

# BRISTOL

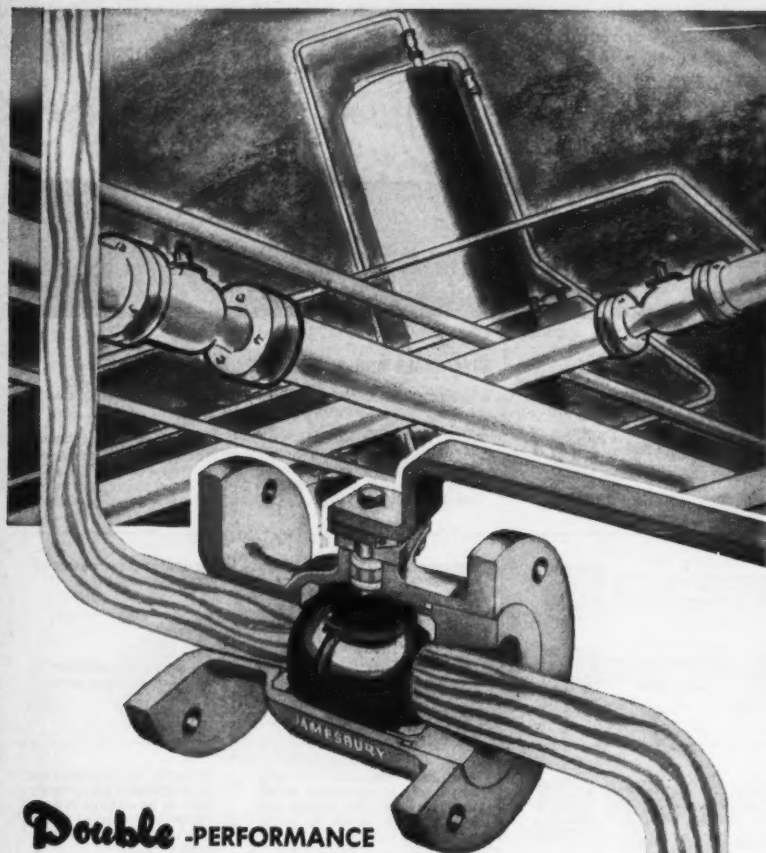
TRAIL-BLAZERS IN PROCESS AUTOMATION  
AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

Check 1781 opposite last page.



# Jamesbury "Double-Seal" Ball Valves

Give Double-Value



## Double-Performance

Wherever the Jamesbury "Double-Seal" principle is employed in its multiple industrial applications, "Superior performance" is the phrase heard everywhere.

**PERFORMANCE** — the direct result of the high-efficiency and the long, maintenance free life of the Jamesbury product: "Double-Seal" Ball Valves.

Ball Valves in pipe sizes  $\frac{1}{4}$ " to 8" in Bronze, Aluminum, Stainless Steel, Carbon Steel. PVC  $\frac{1}{2}$ " to 4". Quarter-turn.

Distributors In Principal Cities.

Get The Complete Facts On The Jamesbury "Ball Valve" Principle.

Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

☐ Jamesbury Literature  
☐ Distributor Service

JAMESBURY CORP., 65 NEW STREET, WORCESTER, MASS.

Check 1782 opposite last page.

**SAFE TO USE  
IN MANY EXPLOSIVE  
ATMOSPHERES!**

**SCAM<sup>®</sup> S-LINE**  
ANNUNCIATOR SYSTEMS



SCAM S-LINE ANNUNCIATORS can be used in a wide range of dangerous or contaminated atmospheres. Features include Failsafe Self-Policing, Momentary Lock-In Alarm, and NO or NC Field Signal Alarm Operation. Cabinet is easily sealed against dust and moisture. Units are versatile . . . available with Backlight or Bull's-Eye Cabinets, separate lamp cabinets and remote plug-in relay cabinets. Suitable for Class 1 Division 2 areas.

**SEND FOR complete SCAM Literature. Give details of your requirements for SCAM Engineering Recommendations. No obligation. See us at the Chemical Industries Show**

**THE SCAM INSTRUMENT CORP.**

Dept. K • 1811 West Irving Park Road • Chicago 13, Illinois  
GRaceland 7-7850

REPRESENTATIVES IN ALL PRINCIPAL CITIES • COMPLETE MONITORING SYSTEMS FOR INDUSTRY

Check 1783 opposite last page.

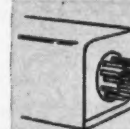
CHEMICAL PROCESSING



Heavy gasket effectively seals front door of cabinet.



Air inlet can be located at sides, bottom or top for ease in connecting to air supply for purging.



Plug-In Relays are hermetically sealed to assure long life, trouble-free operation.



**Records 12 phenomena  
at a time in range  
of DC to 200 cps**

Construction is plug-in type;  
preamps interchangeable

**Uses:** Applications requiring  
permanent records instantly  
which can be reproduced by  
conventional means.

**Features:** With proper pre-  
amplifiers, unit can record 12  
simultaneous phenomena in  
DC to 200-cps frequency



Twelve-channel recording system  
features choice of interchange-  
able plug-in preamplifiers

range on chart. Offers choice  
of interchangeable plug-in  
preamplifiers.

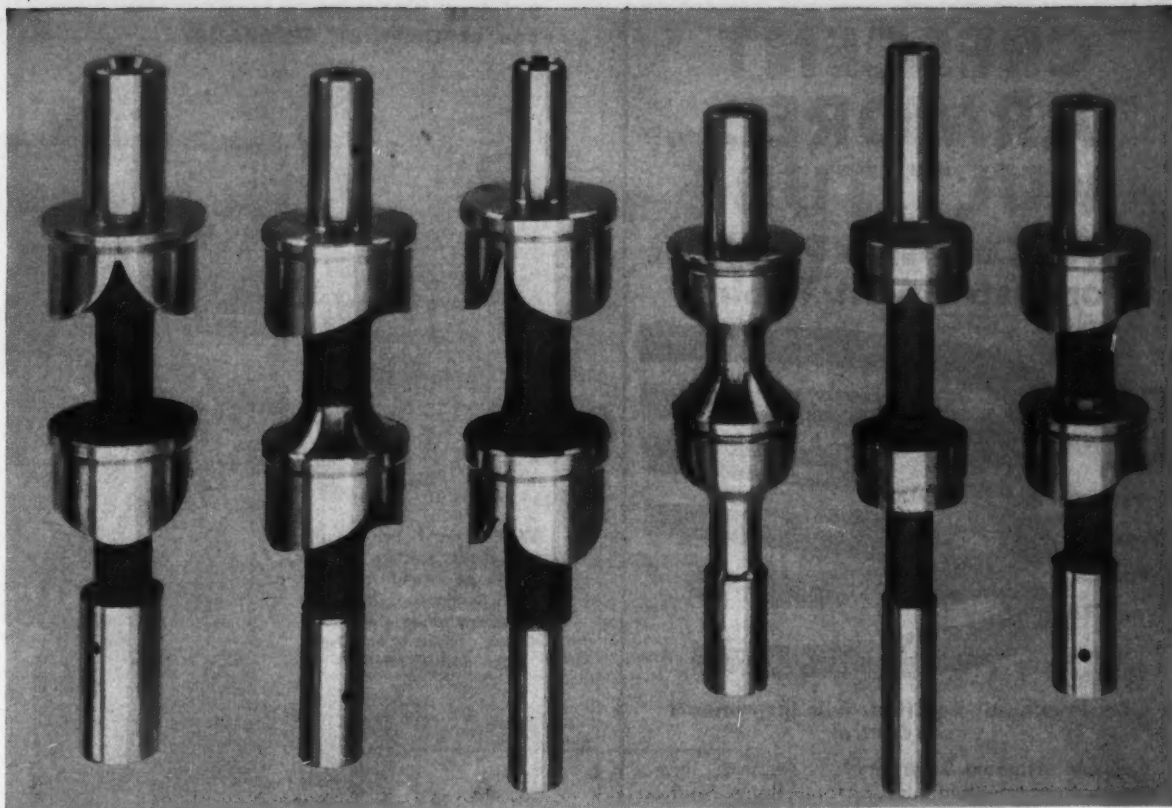
**Description:** System utilizes  
plug-in construction through-  
out so that all components  
may be easily detached for  
convenience in operating and  
servicing.

Each channel has individual  
power supply and driver am-  
plifier that is completely  
transistorized with circuitry  
designed so that amplifier sat-  
uration prevents pen-motor  
overload.

Also featured are 18 push-  
button chart speeds, event  
marker and synchronous  
timer, simplified conversion to  
electric writing, optional plug-  
in remote controls, and indi-  
vidual micrometer adjust-  
ments for accurate pen align-  
ment laterally and longitudi-  
nally.

(BSA-1200 recording system  
is development of Massa Divi-  
sion, Cohu Electronics, Inc., 5  
Fottler Rd., Hingham, Mass.)

Check 1784 opposite last page.



## Inner secrets of inner valves

### FACTS EVERY CONTROL VALVE USER SHOULD KNOW

This is a rare photograph . . . presented in a com-  
pletely unretouched form. It shows the inner valve  
of leading makes of diaphragm control valves. The  
inner valve determines the control result.

The most amazing fact is the size . . . all are  
listed as two inch valves. All are high lift. But  
compare them.

Note the KIELEY & MUELLER inner valve at the  
far left. It equals the others on every point of con-

sideration; exceeds on many. Look at the diameter  
across the skirt . . . that's one reason for the re-  
markable  $C_v$  of K&M valves. Look at skirt length;  
the solid, not fabricated, design. Measure  
the rugged guide posts and the large column.  
Examine the machining and the super-finishing.

It's no wonder . . . K&M is the valve that likes  
to be compared. It's a better valve and a better value  
by every measure of comparison.



diaphragm control valves

FOR THE COMPLETE FACTS . . .  
write for the K&M Valve Engineer-  
ing Data Catalog, Bulletin CV53.

**K&M**

Our 78th Year

**KIELEY & MUELLER, INCORPORATED**

Oldest Pressure and Level Control Valve Manufacturer  
64 Genung Street, Middletown, New York

Check 1785 opposite last page.

# CRESCENT ARMORED MULTITUBE

**Solves Corrosion Problems  
For Instrument Tubing**

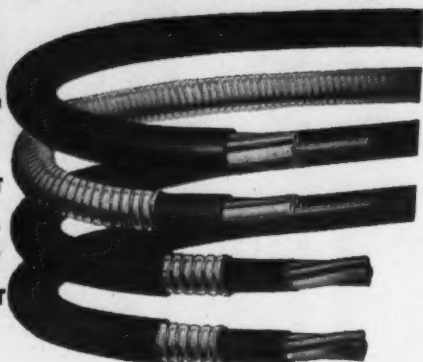
**IN FOUR  
Corrosion  
Resistant  
Types**

**Type CT**

**Type CTA**

**Type CAT**

**Type CTAT**



**For Pneumatic and Hydraulic Instruments  
and Control**

Crescent Armored Multitube® consists of long-length copper, aluminum or polyethylene tubes twisted together to permit bending without distortion. In each layer, one tube is a bright blue color, affording a fast means of identification from both ends.

**Type CT**—For damp or corrosive locations where a moderate degree of mechanical protection to the tube is required. It employs a corrosion-resistant thermoplastic sheath, resistant to water, acids, alkalis, oil, and is flame-retardant.

**Type CTA**—Where maximum mechanical protection is desired during and after installation, such as direct burial in concrete and for pulling into conduit.

**Type CAT**—For protection against corrosion to the armor and to the tubing.

**Type CTAT**—Combining the advantages of Types CTA and CAT, the fourth type illustrated has the polyvinyl chloride thermoplastic sheath both under the armor and over the armor, thus providing maximum mechanical and corrosion protection.

Available in long runs from 2 to 37 tubes of copper, aluminum and polyethylene tubing in sizes 1/4" O.D. This product is licensed under U. S. Patent No. 2,578,280.

Plastic Coated Single Tubes, copper or aluminum should be used to give corrosion protection to all single lines up to the final tube fitting, where trouble from corrosion may occur.

Send for Bulletin No. 458-E

**CRESCENT**  
**INSULATED WIRE & CABLE CO.**  
TRENTON, 5, N. J.

Check 1786 opposite last page.

## PROCESS INSTRUMENTATION and LABORATORY APPARATUS



Weather-proof bell housing allows moisture monitor to be located conveniently outdoors. Switchover to new product stream is simple, requires only re-connecting tubing

## Desiccant costs minimized with moisture monitor

**Instrument extends dehydrator service period by two  
to three months. Pays out in less than a year**



Readout is conveniently located in control building so that supervising operator can quickly check moisture reading

**KARL ROBE**, Editor West

with **L. E. HANSTEDT**, Asst. Department Manager  
and **JACOB GROENEWEGEN**, Instrument Engineer  
Shell Chemical Corp., Torrance, Calif.

**P**roblem: If moisture is not removed from feed gas in demethanizer unit (which takes hydrogen and methane from crude ethylene stream in Shell Chemical Corp.'s Torrance, Calif., plant), fractionating columns can freeze up under minus 100°F operating temperature.

Water in the crude ethylene stream is plentiful because upstream it is cooled by water after cracking. Some water is eliminated in the subsequent compressor operation, but gas is still saturated on its way to demethanizer.

This moisture is removed in dehydra-

CHEMICAL PROCESSING

tors containing Florite desiccant. In operation, one of the three dryers is always being regenerated with hot, dry gas. As the alumina oxide progressively loses its effectiveness, the daily regeneration cycle becomes inadequate for the drying job.

Formerly, the desiccant was replaced well in advance of full use, as a safety factor. This averaged about once every six months. If production schedules were tight, the change was made by rule of thumb — the rule being "after the column began acting up for two or three days in a row, and no other control method worked."

**Solution:** Moisture is now continuously monitored and recorded through an explosion-proof moisture monitor.

Monitor uses a rugged electrolytic cell which separates water from gas stream and electrolyzes it to furnish reading in parts per million. Range for the monitor is from 1 ppm to 1000 ppm water by volume, with accuracy of plus or minus 5% of full chart scale.

Sample flow through instrument is held constant by combined action of a flow controller and a thermostat heater. Simplified design eliminates virtually all moving parts. Maximum temperature range of gas sample is as high as 100°C.

Corrosion-resistant parts are used throughout so that corrosive gases can be handled.

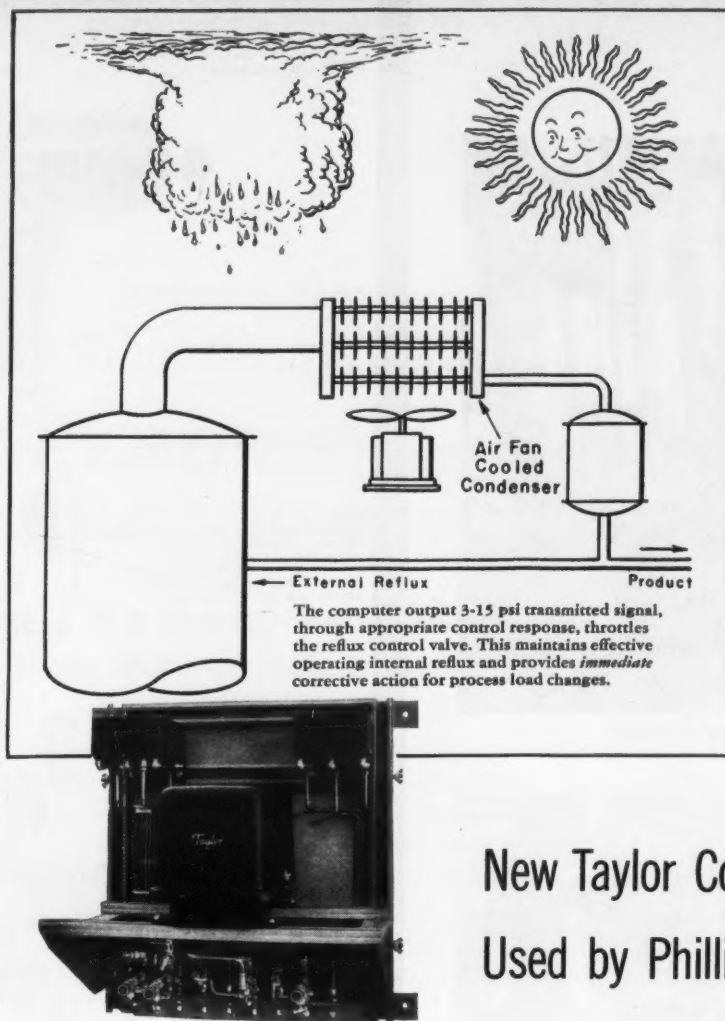
At Shell Chemical's Torrance plant, three separate streams are checked as occasion demands. A convenient sampling system is provided for this purpose. Overhead stream of the ethylene-ethane splitter is checked once per shift.

Similarly, moisture in the product stream is read once a day.

**Results:** Operating personnel now know precisely when to change desiccant. Recorder is read every two hours, and when moisture approaches 20 ppm (the point at which ice begins to form) desiccant is changed.

Since moisture monitor usually indicates a changeover of

To page 108



FOR  
CONSISTENT  
COLUMN  
EFFICIENCY

*...rain or shine*

## New Taylor Computer Control System Used by Phillips Petroleum Company

**PROBLEM:** Column upsets, caused by wide variations in load on the condenser due to changing weather conditions. Efficiency is reduced . . . more steam than necessary is used in reheating excessive reflux.

**SOLUTION:** A simple Taylor Computer Control System which instantly compensates for climatic effects on air-cooled condensers and reflux lines. This system is developed by and is licensed by Phillips Petroleum Company.

**RESULTS:** Phillips is delighted with the outstanding performance of this system, in commercial use on many columns. Phillips' engineers like its simplicity, and the fact that components are of the standard type with which its instrument people are accustomed. Here are some of the advantages of the Taylor Computer Control System:

- 1** It reduces steam consumption by the avoidance of reheating excessive reflux. The system pays for itself in a few months.
- 2** It provides more uniform products by smoothing out upsets at their source—particularly important on a battery of columns.
- 3** Not only does it give vastly improved control on columns utilizing air-cooled condensers (without the need for adjustment of air flow rate), it also pays out with other types of condensers.
- 4** It reduces the possibility of column flooding.

These advantages are applicable to column control wherever problems of column upsets, caused by wide variations in load on the condenser, are experienced. Call your Taylor Field Engineer, or write Taylor Instrument Companies, Rochester, N. Y., or Toronto, Ont.

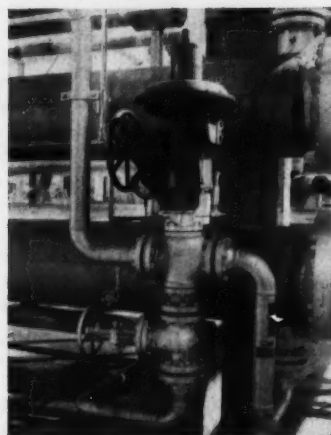
# Taylor Instruments MEAN ACCURACY FIRST

Check 1787 opposite last page.

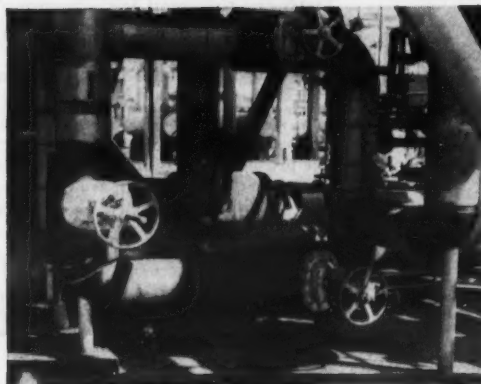




Crude Charge to Furnace



Reactor Effluent Flash Drum Control



Cat-Cracker Feed Control



Gas to Fuel Drum and Flare Drum



Debutanizer Bottoms Control

MOLDED NEOPRENE DIAPHRAGMS WITH LARGE EFFECTIVE AREAS FOR MAXIMUM POWER AND LONG STROKE

LARGE STEEL DIAPHRAGM CASE TREATED TO RESIST CORROSION

HIGH TEMPER ALLOY SPRING DESIGNED FOR LOW STRESS, LONG LIFE AND CORRECT STROKE

RIGID CAST IRON YOKE (WITH ENCLOSED SPRING CASE) RIGIDLY ATTACHED TO BONNET BY STEEL DRIVE NUT — WILL NOT DEFORM IN ROUGH HANDLING

EXTERNAL ADJUSTING SCREW FOR SETTING INITIAL SPRING COMPRESSION

NEW! RECESSED MOUNTING PADS FOR SERIAL AND USER'S IDENTIFICATION PLATES. PROTECTS PLATE FROM ACCIDENTAL REMOVAL, AVOIDS INJURY TO PERSONNEL, SIMPLIFIES MASKING AND PROTECTION AGAINST CORROSIVE ATMOSPHERES.

BOLTED PACKING BOXES — WITH LUBRICATOR IF REQUIRED

LONG, HEAVY PLUG GUIDE SECTIONS AND GUIDE BUSHINGS BUILT FOR SEVERE APPLICATIONS

WIDE VARIETY OF DOUBLE AND SINGLE SEATED PLUGS WITH DESIRABLE FLOW CHARACTERISTICS

HEAVY SEAT RING CONSTRUCTION PREVENTS DISTORTION — ASSURES TIGHT JOINT

A HIGH

PRODUCT

*In the Final Control Element . . .*

## **ACCURACY AND DEPENDABILITY ARE KEY QUALITIES**

**That's Why So Many Process Plants  
Standardize on Masonneilan Control Valves**

Many process control systems — in chemical, paper, petroleum, petrochemical, textile and other plants — use Masonneilan Control Valves exclusively because experience has proved that Masonneilan valves are accurate and dependable. And because they give this top performance over long periods, they are most economical.

The wide variety of applications pictured here

are in one modern petroleum refinery which uses Masonneilan valves. There are Masonneilan types for practically all control systems in all other processing plants, too. If you are concerned with the selection of control valves, it will pay you to consider Masonneilan.

Complete details on control valves for every process use are yours for the asking. Write for catalog.

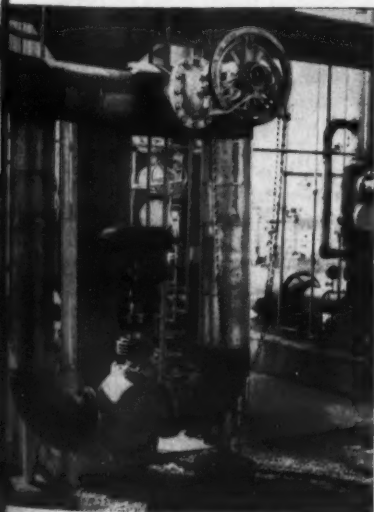
## **MASON-NEILAN**

*A Division of Worthington Corporation*

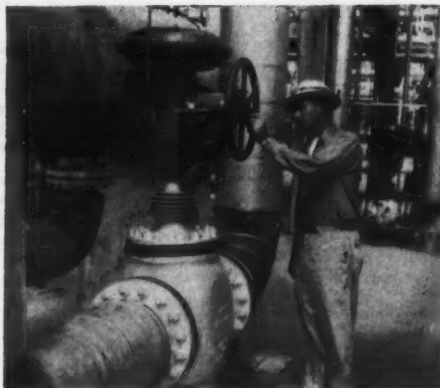
**25 NAHATAN STREET, NORWOOD, MASSACHUSETTS**

*District offices or Distributors in principal cities in U.S.*

*In Canada: Mason-Neilan, Division of Worthington (Canada), Ltd.*



Feed to Storage in Cat Cracker



Effluent Control in Cat Cracker



View of Cat Reformer using Many M-N Valves

For more information on product at left, specify 1788 see information request blank opposite last page.



# NEW GIANT narda SonBLASTER



Generator G-5001  
500 watts output  
Transducerized Tank NT-5001  
Capacity: 10 gallons  
Dimensions: 20" L x 11½" W x 10" D

Generator features tank selector and load selector switches on front panel to operate one or two NT-5001 tanks alternately. Other combinations of tanks and submersible transducers available from stock; larger tanks available on special order.

## \$1325

## For mass-production cleaning and high capacity chemical processing!

Here's a new Narda SonBlaster ultrasonic cleaner with tremendous cavitation activity and generating capacity! Featuring full 500 watts output, this SonBlaster is available with a fully transducerized giant 10-gallon capacity tank. In addition, it will operate from six to 10 Model NT-605 high energy submersible transducers, at any one time, in any arrangement in any shape tank you need up to 70-gallon volume.

Install this new Narda SonBlaster, and immediately you'll start chalking up savings over costly solvent, vapor or alkaline degreasing methods! You'll save on chemicals and solvents, cut maintenance and downtime, eliminate expensive installations, save on floor space, and release labor for other work. But perhaps most important, you'll clean faster, cut rejects, and eliminate bottlenecks.

Whether you're interested in mass-production cleaning or degreasing of mechanical, electronic, optical, or horological parts or assemblies...rapid, quantity cleaning of "hot-lab" apparatus, medical instruments, ceramic materials, electrical components or optical and technical glassware...or in speeding up metal finishing and chemical processing of all types—you'll find this new SonBlaster will do your work faster, better and cheaper. Write for more details now, and we'll include a free questionnaire to help determine the precise model you need. Address: Dept. CP-20.

Consult with Narda for all your ultrasonic requirements. The SonBlaster catalog line of ultrasonic cleaning equipment ranges from 35 watts to 2.5 KW, and includes transducerized tanks as well as immersible transducers which can be adapted to any size or shape tank you may now be using. If ultrasonics can be applied to help improve your process, Narda will recommend the finest, most dependable equipment available for immediate delivery from stock—and at the lowest price in the industry (\$175 up)!

For custom-designed cleaning systems, write to our Industrial Process Division; for information on chemical processing applications, write to our Chemical and Physical Process Division; both at the address below.

**the narda corporation**  
ultrasonics  
625 MAIN STREET, WESTBURY, L.I., N.Y.  
Subsidiary of The Narda Microwave Corporation

Check 1789 opposite last page.

## INSTRUMENTS & LAB

### Moisture Monitor

From page 105

desiccant in eight to nine months instead of arbitrary six-month switch formerly used, several thousand dollars in product and labor are saved within a two-year period. On this basis alone, payout would be about one year.

Periodic moisture readings on ethylene-ethane splitter serve as a safeguard against unwanted moisture creeping into process from other sources.

Ethylene is recycled to serve as refrigerant for the demethanizer, so some savings in heat transfer losses are also gained, since increased hydrates in cooling gas cut down heat exchange in the condenser.

(Type 26-310 Process Moisture Monitor is product of Consolidated Electrodynamics Corp., 360 Sierra Madre Villa, Pasadena, Calif.)

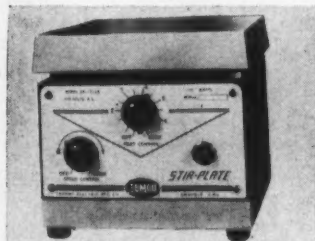
Check 1790 opposite last page.

### Stir under vacuum or in odd-shaped, narrow vessels

Magnetic stirring combined with heating

Uses: Stirring and heating material simultaneously in non-magnetic containers of many shapes.

Features: Magnetic action makes possible stirring of liquids in enclosed or vacuum-sealed systems, odd-shaped or narrow-necked vessels, or other non-magnetic containers inaccessible to



Unit stirs and heats simultaneously. It will handle a wide variety of containers inaccessible to many other stirring devices



- ELECTRONIC LIQUID LEVEL
- INDUSTRIAL TIMERS
- TIME SWITCHES
- MAGNETIC SWITCHES
- ELECTRONIC SWITCHES

Your business is of first importance, therefore, all LUMENITE manufacturing and engineering are devoted to the sole production of Controls. In the following list of Bulletins there is a Control best suited to your operation in a money making and saving way.

For complete information and prices check ☒ the Bulletins you want. We'll send them without obligation. Tear out the ad and use it for your requests.

The Bulletins are technically informative; with load capacities, installation diagrams, etc.

- |   |   |
|---|---|
| <input type="checkbox"/> TIME SWITCHES        | <input type="checkbox"/> NONCONDUCTIVE LIQUID                   |
| <input type="checkbox"/> PROGRAM CLOCKS       | <input type="checkbox"/> AUTOMATIC RESET                        |
| <input type="checkbox"/> CYCLE REPEATERS      | <input type="checkbox"/> ICE THICKNESS                          |
| <input type="checkbox"/> TIME DELAY RELAY     | <input type="checkbox"/> BOILER LEVEL                           |
| <input type="checkbox"/> AUTO-LAWN SPRINKLERS | <input type="checkbox"/> MOTORIZED SANITARY VALVES              |
| <input type="checkbox"/> LIQUID LEVEL         | <input type="checkbox"/> INTERVAL TIMERS                        |
| <input type="checkbox"/> MILK LEVEL           | <input type="checkbox"/> PHOTO-ELECTRONIC RELAYS-COUNTERS, ETC. |

All LUMENITE products have a responsible guarantee

**LUMENITE ELECTRONIC CO.**  
ENGINEERS • DESIGNERS • MANUFACTURERS  
407 South Dearborn Street Chicago 5, Illinois

Check 1791 opposite last page.

## MEASURE CO DIRECTLY

WITH THE  
**MONOXOR®**  
CARBON MONOXIDE INDICATOR



THIS REMARKABLY SIMPLIFIED INSTRUMENT INDICATES CARBON MONOXIDE PERCENT IN THE AIR SAMPLE TESTED BY MEASUREMENT OF CO-STAIN IN THE INDICATING TUBE.

- ✓ Requires no color matching — is independent of operator's color perceptiveness.
- ✓ Accurate and dependable over wide range of lighting conditions.
- ✓ Not affected by presence of other gases normally encountered in safety testing (nitrous oxide, sulphur dioxide, methane, etc.)

- Range: 10 to 2000 PARTS CO per MILLION PARTS of AIR (0.001% to 0.2% CARBON MONOXIDE)

M-31 For complete particulars, send for Leaflet 890A

BACHARACH INDUSTRIAL INSTRUMENT CO., 200 N. BRADDOCK AVE., PITTSBURGH 8, PA.  
Send me a copy of MONOXOR CO Indicator LEAFLET 890A

NAME \_\_\_\_\_ POSITION \_\_\_\_\_  
COMPANY \_\_\_\_\_  
STREET \_\_\_\_\_  
CITY AND STATE \_\_\_\_\_

Check 1792 opposite last page.

CHEMICAL PROCESSING



many other stirring devices. Closely controlled heat can be simultaneously applied over a wide temperature range.

**Description:** Motor-driven magnet rotates beneath heating plate and exerts torque on stirring magnet capsule placed in liquid. **Stirring speed** is completely variable to 1140 rpm in liquids of viscosity up to 140 centipoises. Sensitive thermostat provides close, stepless control over entire range to 700°F. Heating element is made of highest grade coiled nickel-chromium alloy embedded in refractory plate.

Stirring magnets are coated with Teflon for effective resistance against a wide range of corrosive media.

(Temco Stir-Plate is a product of Thermo Electric Manufacturing Co., PO Box 697, Dubuque, Iowa.)

Check 1793 opposite last page.

#### Accuracy of $\pm 1$ to $\pm 5^\circ\text{F}$ for temp recorders

**Uses:** In process monitoring and applications requiring periodic, accurate recording of temperatures on intermittent or round-the-clock basis.

**Features:** System accurate to  $\pm 1^\circ\text{F}$  in two lower ranges and  $\pm 5^\circ\text{F}$  in 0-to-1200°F range.

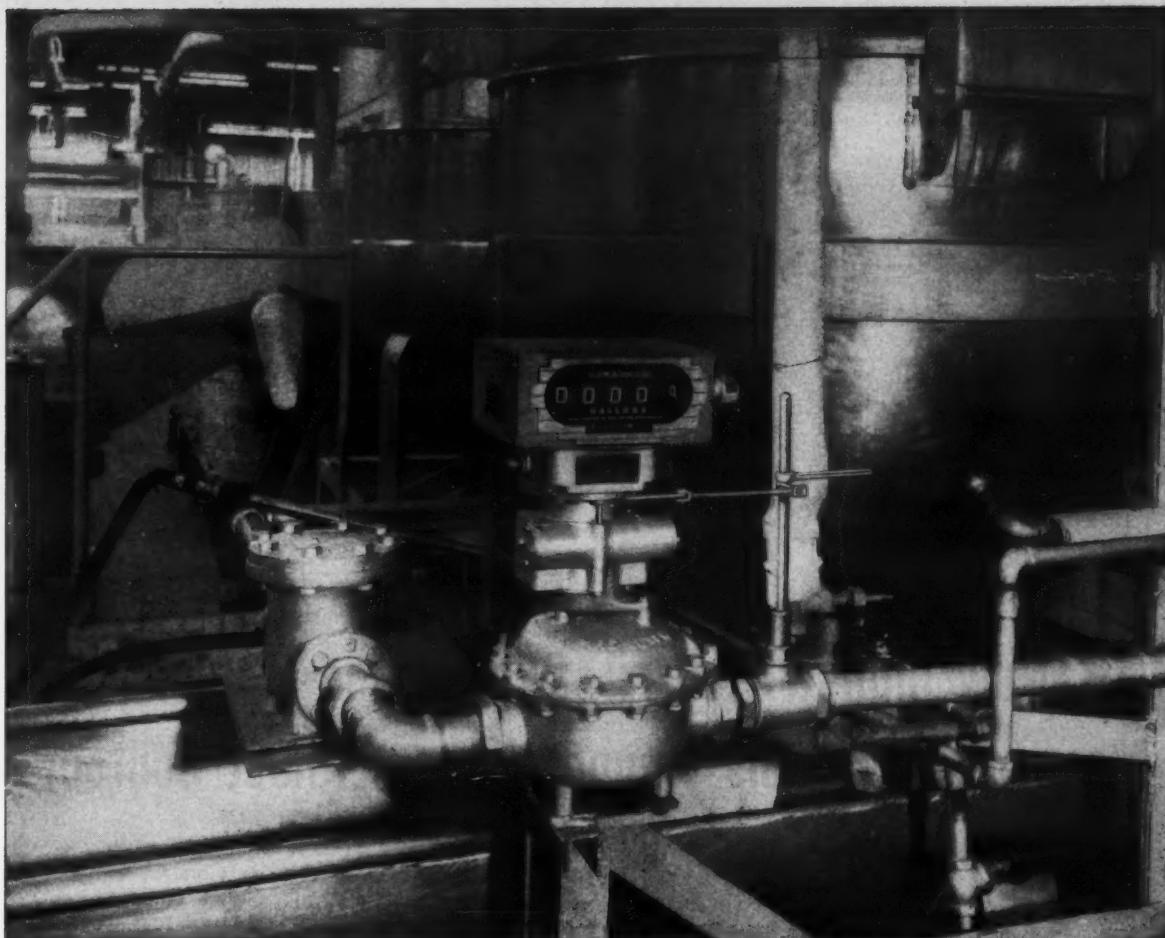
**Description:** Consisting of input scanner, self-balancing potentiometers, shaft encoders, encoder selector, control chassis, programmer, digital clock, and electric typewriter, temperature-data recording system provides three temperature ranges —  $-30$  to  $120^\circ\text{F}$ ,  $250$  to  $600^\circ\text{F}$ , and  $0$  to  $1200^\circ\text{F}$ .

Unit scans at rate of three seconds per data point, with cycle duration of 225 seconds. Cycle may be initiated manually or automatically  $\frac{1}{2}$  to 3 minutes after completion of last logging cycle.

Readout formula is two decimal digits of identification followed by four decimal digits of temperature.

(Temperature-data recording system is development of Dax Corporation, 1307 S. Myrtle Ave., Monrovia, Calif.)

Check 1794 opposite last page.



Rockwell Model ER Meter with automatic quantity control shut-off in food processing plant

## Batch it, blend it, or just plain account for it!

## IT'S GOOD BUSINESS TO METER ALL LIQUIDS

Wherever liquids are stored, mixed or used in plant operations, you can save time, money and improve efficiency with Rockwell industrial meters. With meters you can batch, blend and control formulas with precision. Handling volatile liquids, metering provides the safety of a closed piping system and guards against contamination.

Rockwell industrial meters are valuable accounting tools. Thousands use them for in-plant cost identification purposes, for inventory control—even to guard plant security.

You can measure most any piped liquid with Rockwell meters—oils, liquors, paints, chemical solutions—over 50 liquids in all. Use the coupon for full details.

CLIP COUPON—MAIL TODAY!



.....

ROCKWELL MANUFACTURING CO.  
Pittsburgh 8, Pa.  
Gentlemen:  
I am interested in measuring \_\_\_\_\_ (Name of Liquid)  
Pipe Size \_\_\_\_\_ " \_\_\_\_\_  
Working Pressure \_\_\_\_\_ psi Temperature \_\_\_\_\_ °F max.  
Max. Flow Rate \_\_\_\_\_ gpm Min. Flow Rate \_\_\_\_\_ gpm  
Your Name \_\_\_\_\_  
Company \_\_\_\_\_  
Street \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_  
.....

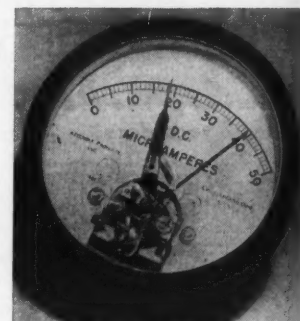
Check 1795 opposite last page.

**Set point on meter-relay indicated continuously regardless of level**

**Uses:** Applications requiring meter-relays.

**Features:** Through continuous reading device, signal level is shown at all times by moving pointer, even after set point has been passed and control circuits energized. Circuits remain operative until reset requires opposite action.

**Description:** V-shaped toggle with contacts on each arm is key to continuous reading feature. It is pivoted on under side of adjustable pointer marking set point. Both toggle and pointer are comprised of layers of isolated metal-parts of separate circuits from respective toggle contacts.

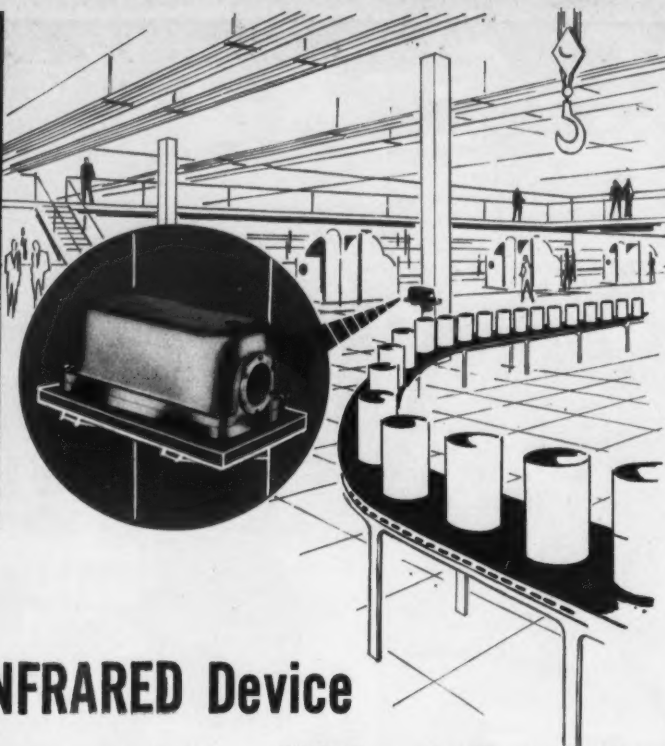


Although indicating pointer has passed set point, control circuits remain energized in continuous reading meter-relay

When pointer reaches set point, two things happen. 1) Pointer and toggle make contact, closing circuit through booster coil and multi-pole load-relay coil. Booster coil assures firm meter-relay contact. action. 2) As desired control action is initiated through one set of contacts, another set closes, pulling surge of current through meter-relay movement which adds adequate torque to indicating pointer to force it past toggle.

Meter-relay contacts are then separated and booster circuit opened. Sequence may begin at either high or low limit.

Load relay remains energized while signal is higher



## New Industrial INFRARED Device Measures...Controls Temperature...Without Contact

Since World War II, there has been an accelerated development of materials and components for infrared guidance and reconnaissance systems. A number of components and techniques, developed for military use, are now being applied to industrial instrumentation. Radiation Electronics Company has developed several types of infrared instruments for remote temperature measurement and control now being used in the production and testing of paper, glass, rubber, metals, and plastics.

The Thermodot radiation thermometer, Model TD-3, has been designed specifically for production plant operation. Since the operation is completely remote, Thermodot readily measures and controls the temperature of moving and inaccessible surfaces. The high sensitivity of Thermodot provides reliable measurements at low temperatures—the lowest standard range is 400°F full scale. Other standard ranges extend to 2000°F. Measurements are completely

automatic and continuous, and the response time is two seconds. An internal calibration source provides rapid and accurate standardization.

Thermodot measures the temperature of a remote object without physical contact. Operation is based on the fact that an object emits thermal radiation as a function of its temperature. An infrared lens, located in the Thermodot optical head, is used to focus this radiation onto a sensitive infrared detector. The detector generates a signal voltage accurately proportional to the radiation intensity, and the signal is amplified to drive an indicator calibrated directly in temperature.

The infrared radiation detecting element is hermetically sealed to prevent contamination by vapors and fumes. In addition, the optical assembly is housed in a sturdy, dust-tight enclosure and is

insensitive to vibration and shock as normally encountered in the plant. Ambient temperature variations from 20-120°F have no effect on its operation.

**Complete Thermodot Model TD-3 Consists of Optical Head, Power Supply and an Indicating Controller**

### SPECIFICATIONS OF THERMODOOT MODEL TD-3

**WORKING DISTANCE** . . Any range greater than one foot (prefocused at factory).

**SPEED** . . . . . Responds in two seconds.

**CALIBRATION** . . Internal reference source permits accurate standardization in seconds.

**EMISSION COMPENSATION** . . Adjustable at control panel.

**AMBIENT CONDITIONS** . Unaffected by ambient temperature variations from 20-120°F.

*For more information, write for Bulletin R-100, or visit our Booths No. 1155 and 1157 at the Chemical Exposition, November 30-December 4 in New York City.*



**RADIATION ELECTRONICS CO.**

5600 Jarvis Avenue, Chicago 48, Illinois • Telephone: SPing 5-2400  
DIVISION OF COMPTON CORPORATION

Check 1796 opposite last page.



or lower than set point. When indicating pointer returns to set point, contact is again made, closing booster-coil circuit and dropping out load relay. Indicating pointer pushes past toggle, opening booster circuit again.

Toggle is so designed and positioned that indicating pointer always strikes contact on further toggle arm.

(Continuous reading meter-relays are manufactured by Assembly Products, Inc., Chesterland, Ohio.)

Check 1797 opposite last page.

### Mercury pressure gages eliminate calibration

**Uses:** Measuring either static or differential pressures.

**Features:** Gages do not require calibration, having no moving parts to affect calibration. Accuracy is permanent.

**Description:** Based on principle of mercury manometer, three pressure gages have ranges of 8, 12, and 16" Hg to measure maximum static pressures of 4, 6, and 8 lb, respectively.

Each model is equipped with non-glare duplex scale, reading in inches and tenths, and pounds and tenths. Indicating tube, made of heavy-wall, heat-resistant glass, is protected by durable body.

Non-spill arrangement prevents loss of mercury through overpressure or mishandling. Gages have standard 1/8" fittings and are easily installed.

(Mercury pressure gages are products of Meriam Instrument Co., 10920 Madison Ave., Cleveland 2, Ohio.)

Check 1798 opposite last page.

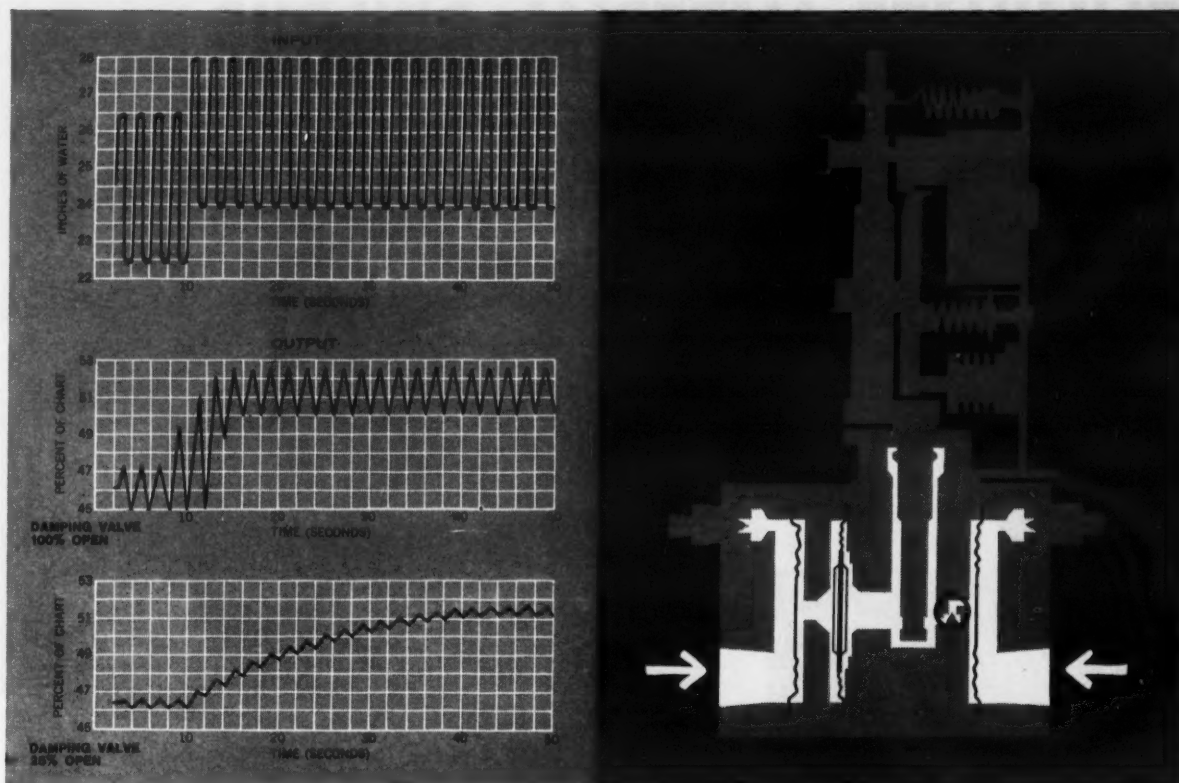
**Pneumatic recorder-controllers** are depicted in Bul 13-18 — The Foxboro Company, 8111 Neponset Ave., Foxboro, Mass.

Check 1799 opposite last page.

**Flowmeters** are delineated in Meter Data Bul 566 — Neptune Meter Company, 19 W. 50th St., New York 20, N.Y.

Check 1800 opposite last page.

## NEW **dp** TRANSMITTER SOLVES FLOW PULSATION PROBLEMS WITH ADJUSTABLE INTERNAL DAMPING



Only Fischer & Porter **dp** Transmitters let you "tune in" exactly the right amount of damping action for the pipeline flow you're measuring. By eliminating the over-damping on some lines, underdamping on others resulting from fixed damping techniques, F & P gives you faster, more accurate response, longer instrument life.

In the unique F & P system, a needle valve restricts oil flow through the sealed, silicone-filled measuring chamber. Damping is accomplished on the input side—before the differential is sensed—thus the

transmitter responds only to *real* inputs. You eliminate external dashpots and snubbers . . . the major cause of zero shift and diaphragm fatigue . . . both of which mean high maintenance costs and premature replacement.

\* \* \*

Write for complete information on how adjustable damping avoids control errors by matching the damping to the pulsation. Ask for your copy of Bulletin 91-251. Fischer & Porter Co., 3019 County Line Road, Hatboro, Pennsylvania.

## **FP** FISCHER & PORTER COMPANY

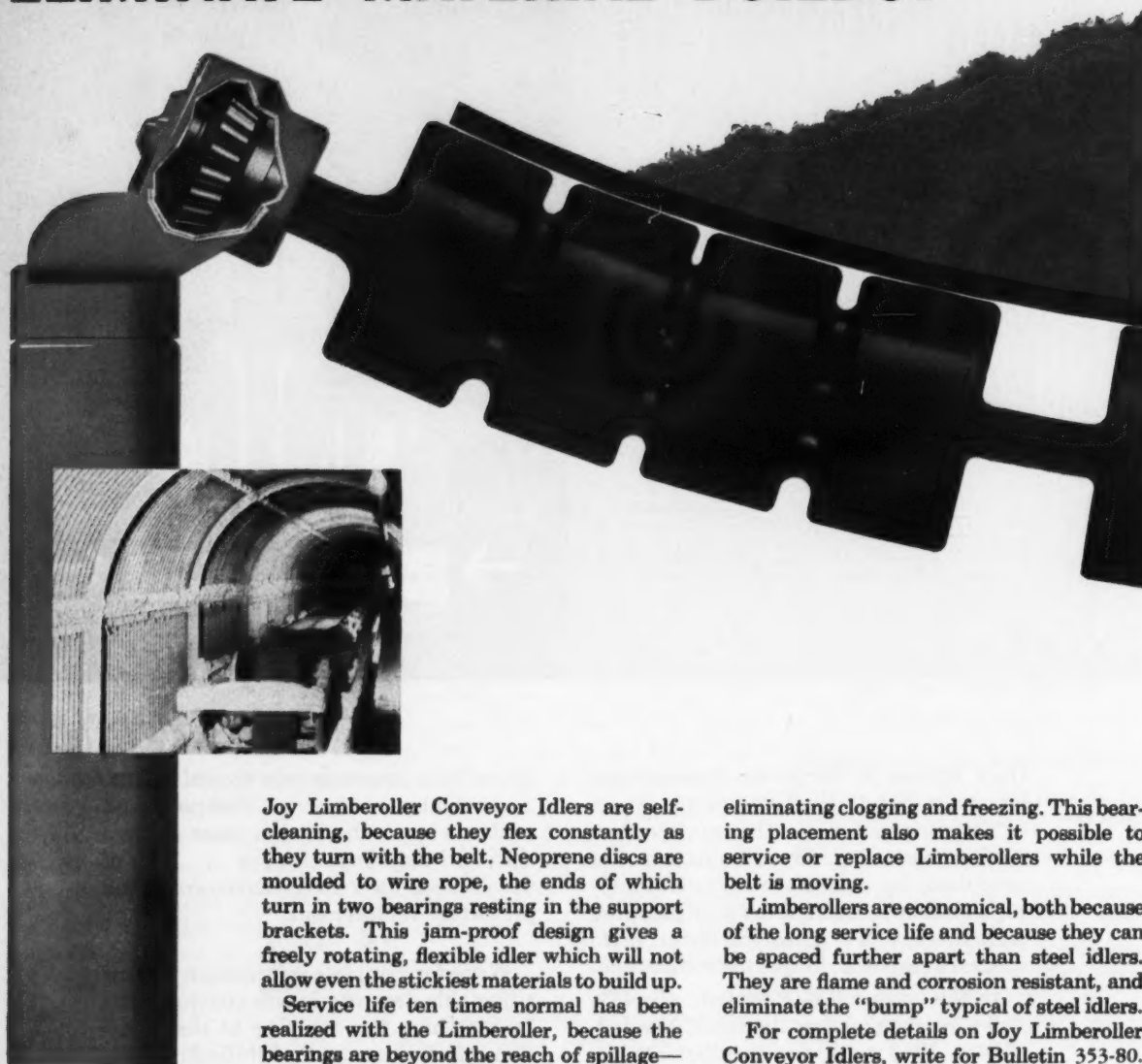
COMPLETE PROCESS INSTRUMENTATION

These MANUFACTURING AFFILIATES carry Fischer & Porter engineering designs to the far corners of the earth: FISCHER & PORTER LTD., WORKINGTON, CUMBERLAND, ENGLAND • FISCHER & PORTER G.M.B.H., GROSS-ELLERSHAUSEN, BEI GOTTINGEN, GERMANY • FISCHER & PORTER N.V., KOMEETWEG 11, THE HAGUE, NETHERLANDS • FISCHER & PORTER PTY. LTD., 184 HANNA ST., SOUTH MELBOURNE, VICTORIA, AUSTRALIA

Check 1801 opposite last page.



# SELF-CLEANING JOY LIMBEROLLER® CONVEYOR IDLERS ELIMINATE MATERIAL BUILDUP



Joy Limberoller Conveyor Idlers are self-cleaning, because they flex constantly as they turn with the belt. Neoprene discs are moulded to wire rope, the ends of which turn in two bearings resting in the support brackets. This jam-proof design gives a freely rotating, flexible idler which will not allow even the stickiest materials to build up.

Service life ten times normal has been realized with the Limberoller, because the bearings are beyond the reach of spillage—

eliminating clogging and freezing. This bearing placement also makes it possible to service or replace Limberollers while the belt is moving.

Limberollers are economical, both because of the long service life and because they can be spaced further apart than steel idlers. They are flame and corrosion resistant, and eliminate the "bump" typical of steel idlers.

For complete details on Joy Limberoller Conveyor Idlers, write for Bulletin 353-80.



**EQUIPMENT FOR ALL INDUSTRY**



Dust Collectors



Compressors



Conveyors and Idlers



Fans and Blowers

# JOY

**Joy Manufacturing Company**  
Oliver Building, Pittsburgh 22, Pa.

In Canada: Joy Manufacturing Company  
(Canada) Limited, Galt, Ontario

## INSTRUMENTS & LAB

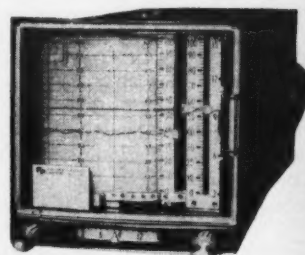
**Operate recorder month without replenishing supply of ink**

**Uses:** Applications requiring chart recording and controlling.

**Features:** Flip switch reverses controller action from air-to-open to air-to-close. Inking system provides full month's record without refilling.

**Description:** Recorder and recorder-controller are equipped with four-inch rectilinear chart, 14-hr visible chart record, lifetime-calibrated Ni-Span C measuring capsules, and continuous valve-pressure indication.

Recording and indicating chassis are interchangeable,



and internal parts are easily accessible. Chassis may be reached and removed without disturbing process even while operating on automatic control.

Units have universal manifold design for either plug-in or remote-mounted controller. Other features include built-in damping of pneumatic input signals, fused chart motor, and bold, easy-to-read scales with colored pointers.

(Mark III chart recorder and recorder-controller are manufactured by Fischer & Porter Co., 143 Jacksonville Rd., Hatboro, Pa.)

Check 1803 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Check 1802 opposite last page.



One of large titanium valves in shop of manufacturer

**Selected for plant in Cuba after test work indicated that titanium was the only high-strength metal able to resist the destructive action of leach solutions at 525 psi over full range of temperatures —**

## Titanium valves and piping resist corrosive slurry at 500°F

**GORDON WEYERMULLER**, Associate Editor  
with **L. F. ENGLE**, Supervisor of Leaching  
Moa Bay Mining Co., Moa Bay, Cuba

**Problem:** A metal that would withstand the erosive-corrosive action of a sulfuric acid slurry at 500°F was sought in early test work undertaken prior to construction of nickel-cobalt plant in Cuba. The \$75 million plant of Moa Bay Mining Co., subsidiary of Freeport Nickel Company, will go on stream late in the third quarter of 1959.

Solutions contain 2-5% free sulfuric acid — along with nickel, iron, aluminum, magnesium, and manganese sulfates in concentrations up to 1% by weight each — and small amounts of cobalt, copper, zinc, and hexavalent chromium.

**Solution:** Test work showed that stainless and nickel-base alloys were satisfactory up to 300°F. Above this temperature, the only metal or alloy found satisfactory for this application was titanium.

Based on these laboratory and pilot plant results, twenty 5" titanium valves, a number of 1" titanium valves, and seven tons of titanium pipe were placed in service.

The 5" valves in Cuban plant are fabricated of cast and forged, commercially pure titanium, with ceramic seats and discs. They are built in

Y pattern. Some are equipped with hydraulic cylinder operator and others are hand-wheel operated. The 1" valves are forged, commercially pure titanium plug gate type used as stop valves.

### Port Nickel

After primary leaching is done in Cuban plant, lateritic nickel ores are further purified in plant at Port Nickel, La., near New Orleans. Here temperatures are somewhat below the 500°F in Cuban plant but conditions are still quite severe.

At Port Nickel, nickel-cobalt sulfides are oxidized to sulfates with high-pressure air in an acid medium. Solutions contain 1.5-2.0% free sulfuric acid and more than 10% dissolved nickel sulfate. A large excess of unreacted nickel sulfide is in suspension, solids content being up to 40%.

Since titanium is able to withstand the erosive effect of the corrosive slurry at 525 psi, it is also used at Port Nickel. Twenty-four 3 and 4" valves of same design as the 5" valves are in use at Port Nickel along with the necessary piping assemblies.

Titanium pipe used at Moa Bay ranges to 8½" OD (0.371" wall). It was produced in St. Louis by rolling and longitudinally welding commercially pure titanium plate with a minimum yield of 55,000 psi.

All forming operations were at temperatures below 1000°F. All welds were X-rayed. Extremely close diametrical and thickness tolerances had to be maintained due to close fit-up required for inert-arc butt welding. Base hardness of

plate material had a maximum Brinell of 210. Brinell hardness of any weld could not be more than 30 points more.

All pipe was subjected to a hydrostatic test which would produce a wall stress equal to 1½ times allowable stress at 100°F. Each length of pipe was also given a 100% liquid dye penetrant examination to detect any possible flaws.

All pipe turns were designed using large radius pipe



Insulation being installed on titanium piping on top of leaching reactors at plant in Cuba

## ANOTHER VANTON FIRST: **ALL-PVC** CENTRIFUGAL PUMP

### NEW PLASTIC UNIT RESISTS CORROSION AND CONTAMINATION

As usual, Vanton is first in another plastic fluid handling innovation: an all-PVC centrifugal! All wetted parts of this new pump are constructed of unplasticized, unmodified polyvinyl chloride, offering the broadest possible resistance to chemical corrosion, **PLUS** non-contaminating transfer of sensitive solutions, **PLUS** a cost lower than most alloy pumps for similar applications!

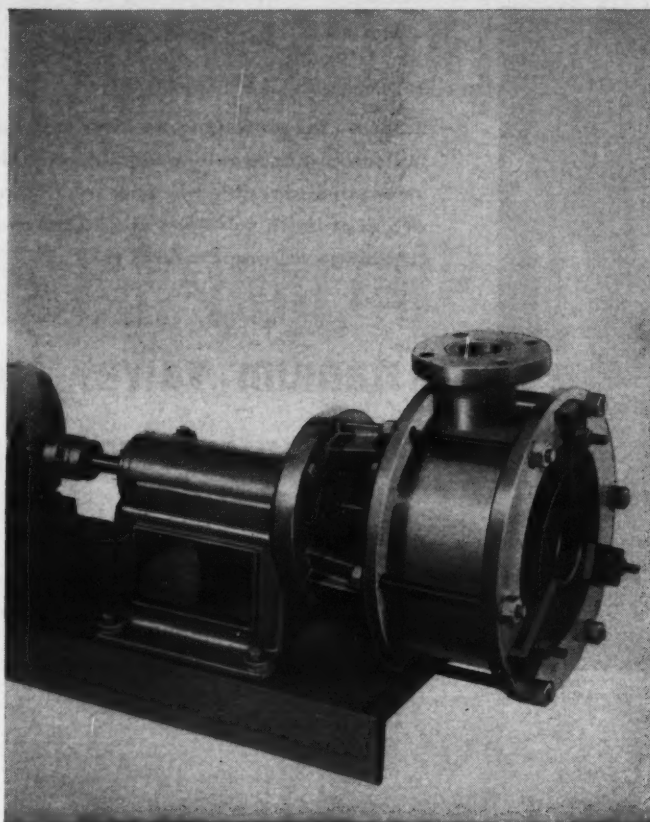
### CHECK THESE RUGGED CONSTRUCTION FEATURES:

Cast iron frame gives rigid support and protection to heavy, sectioned PVC casing. Molded, balanced-design impellers — contoured vanes give maximum energy-transfer efficiency. Low-friction roller bearings, widely spaced to reduce loading, provide quiet operation. Ample grease reservoir prolongs bearing life. Rigidity of construction — this heavy-duty bearing pedestal can really take it! Latest-design mechanical seals — Fluid contacts only facings of rotating and stationary rings. Wide range of materials available cover virtually all corrosive applications. Rotating rings in DuPont Teflon or carbon. Stationary rings in ceramic or Stellite, reversible for additional use after extended periods of service.

### WRITE FOR LITERATURE TODAY! **VANTON PUMP & EQUIPMENT CORP.**

DIVISION OF COOPER ALLOY CORP., HILLSIDE, N. J.

**SPECIALISTS IN PLASTIC FLUID HANDLING. PLASTIC PUMPS, VALVES, PIPING, FITTINGS, SPECIALTIES**



Check 1804 opposite last page.

### *St. Louis Firm Brings Advanced Old World Techniques to the New...*

## Engineering, Fabrication and Application of Pre-Stressed, Ceramic Linings Introduced to U.S. by CORROSION-PROOFING

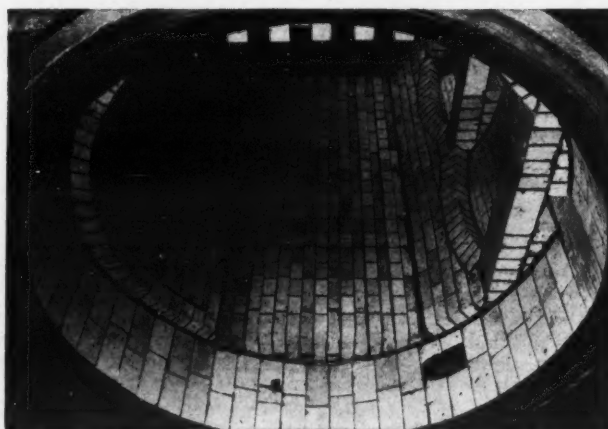
Years-ahead methods used by West German engineers and scientists to achieve greater control of thermal and chemical shock are now available to American industry through Corrosion-Proofing of St. Louis, Missouri. The new techniques from Europe represent an important stride toward greater corrosion control.

Corrosion-Proofing is the first U. S. firm to offer engineering, fabrication and application of pre-stressed, ceramic linings for chemical vessels and steel process equipment. Extensive field experience proves that these linings are superior to alloys in absorbing thermal and chemical shock.

Corrosion Proofing—offering the engineering, fabrication and application of pre-stressed, ceramic linings; pre-stressed, plastic linings; cured, reinforced resinous linings and elastomeric and liquid linings—invites your inquiry. Brochure is available upon request.

**CORROSION-PROOFING**

DIVISION OF SHUTT PROCESS EQUIPMENT CORP.  
3627 MANCHESTER AVE. • ST. LOUIS 10, MISSOURI



SECTION OF WEST GERMAN REACTOR VESSEL SHOWING PRE-STRESSED BRICKWORK LINING IN STEEL SHELL



Check 1805 opposite last page.

## CORROSION CONTROL

bends because of the highly erosive action of acid slurry. Short-radius turns in piping could not be tolerated. Thus, welding elbows could not be used.

Fittings such as welding reducers and lap-joint stub ends were required. These were centrifugally cast in vacuum molds and completely machined inside and out at a plant in Oregon.

Titanium pipe and fittings were sent to manufacturer of the titanium valves in Chicago. Here pipe was fabricated and assembled ready for installation.

Titanium is not notably susceptible to heat hardening. However, cold working brings about rapid work hardening. Therefore, hot bending was used in order to maintain minimum hardness of base material before welding.

Pipe was sand filled and heated in an oil-fired furnace. To avoid flame impingement on titanium pipe, it was placed on a bed of sand inside a larger diameter piece of carbon steel pipe and then baked. Temperatures were controlled by use of thermocouples on pipe.

During bending, longitudinal weld seam was placed in neutral axis. Extreme care

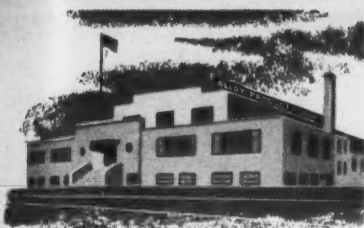


Titanium piping was fabricated into a variety of intricate assemblies

was used in pulling pipe bends to prevent either distortion or wall thinning. Bend portion of pipe was liquid dye penetrant tested as a check against possible flaws caused by the bending.

Rigid qualification tests were set up for operators designated to do the welding. All butt welds had to be full-penetration welds without backup rings. Hence, ends had to be machined to match perfectly. Close tolerances were specified on inside weld concavity





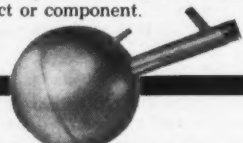
## A-P-C's complete plant integration

**spells complete quality control for your stainless steel components**

A-P-C does all your work under one roof — one supervisory staff — one management. Total responsibility is in the hands of A-P-C, for A-P-C is perhaps the most completely integrated stainless steel fabricating plant in the country.



Manned by personnel who are craftsmen exclusively in stainless steel, every phase of production is under their control from the original steel plate to the finished end product or component.



Engineering, drawing (and in deep intricate shapes), heat treating, pickling, skilled welding, machining, polishing — there is not a single operation which is not under A-P-C's direct management.



That's why when you buy A-P-C, you can be certain of absolute dependability. Write for estimates, send drawings or request engineering consultation. They're yours for the asking.

### ALLOY PRODUCTS CORP.

1075 Perkins Avenue  
Waukesha, Wis.

Check 1806 opposite last page.

NOVEMBER 1959

## CORROSION CONTROL

and internal weld crown.

Circumferential butt welds were made by inert-gas-shielded method of welding. Argon was used as protective atmosphere. Special trailing shields were designed to exclude outside contaminating air from molten pool. All nozzle welds were made in a plastic balloon filled with argon.

After fabrication, all assemblies were stress relieved in furnace at 900-1000°F for minimum of 35 minutes.

Titanium is extremely notch sensitive. For this reason, care was taken to avoid dents. When a crane was needed to move assemblies, rope slings were employed. Supports used to cradle pipe for machining were padded with sheet asbestos. Special precautions were taken in shipping pipe to Cuba to avoid scratching or gouging it.

**Results:** Throughout laboratory testing work and pilot plant operations conducted by Freeport Nickel over a two-year period, titanium showed a corrosion rate of essentially zero for the severely erosive-corrosive conditions at temperatures to 500°F described. Performance data are not available as yet on titanium valves and piping in plant. Excellent service is expected, however.

(Titanium valves and piping assemblies were fabricated by Crane Co., 836 S. Michigan Ave., Chicago 5, Ill.)

Check 1807 opposite last page.

(Titanium pipe was fabricated from plate by Nooter Corporation, 1400 S. 2nd St., St. Louis 4, Mo.)

Check 1808 opposite last page.

(Titanium forging and castings for fittings and valves were manufactured by Oregon Metallurgical Corp., PO Box 484, Albany, Oregon.)

Check 1809 opposite last page.

(Moa Bay plant was designed and engineered by C. F. Braun & Co., 1000 S. Fremont Ave., Alhambra, Calif. C. F. Braun also designed, engineered, and constructed the Port Nickel plant.)



## IT'S CHECK AND DOUBLE CHECK AT LITHCOTE TO ASSURE THE CORROSION PROTECTION YOU WANT...

Don't let anybody sell you on a "bargain" protective coatings job. To do it right takes the best of materials, the right kind of equipment—and a system of constant double checking.

This extra precaution may keep initial costs a shade above the bargain job, but it saves you plenty in the long run.

Whether your protective coating requirements are large or small, a shop job or a field job, you will be more than satisfied by Lithcote.

YOUR MOST DEPENDABLE SOURCE FOR THE BEST IN PROTECTIVE COATINGS

ASK FOR YOUR  
**LITHCOTE**  
CATALOG



Since 1936, Lithcote has solved the corrosion and contamination problems encountered in these big industries:

- ▶ Processing
- ▶ Transportation
- ▶ Chemical and Pharmaceutical
- ▶ Pulp and Paper
- ▶ Petroleum
- ▶ Food and Beverage

A Lithcote Representative will gladly tell you more.



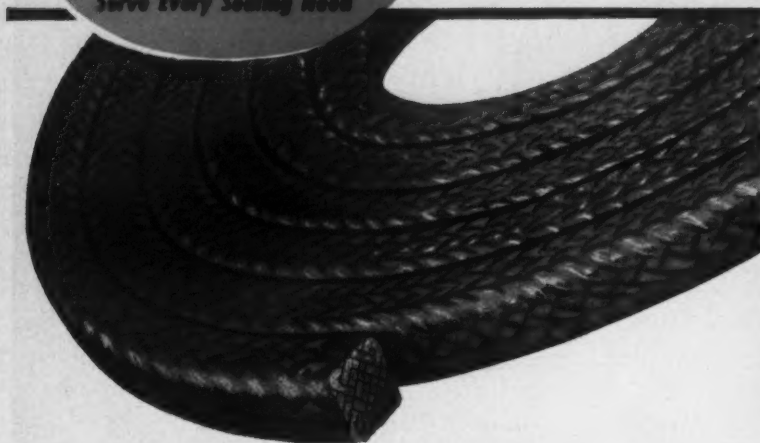
## LITHCOTE CORPORATION

5000 W. Lake St., Melrose Park, Ill. • 42 Bolden Ave., Norwalk, Conn.

Check 1810 opposite last page.

**MOST  
COMPLETE LINE**

*Eleven Product Groups  
Serve Every Sealing Need*



GROUP NO. 4

## Criss-Cross Braided Packings

A revolutionary Braided construction in which every strand passes diagonally *through* the body of the packing and becomes an integral part of the whole, making it stronger, longer wearing, better lubricated.

Belmont offers a wide variety of styles of Criss-Cross Braided Packings in long fibre Canadian asbestos, blue African asbestos, wire-inserted asbestos, flax, cotton, Teflon\* yarn, Teflon ribbon and Teflon impregnated blue and white asbestos—for low, medium and high pressure service and temperatures to 700° F—sealing against steam, water, air, gases, oil, gasoline, alcohol, corrosive chemicals, and for positively non-contaminating service.

See your Belmont Distributor or write for the name of the one nearest you.

**MOST  
CONVENIENTLY AVAILABLE**

*Nationwide Industrial  
Distributor Organization  
Provides On-the-Spot Service*

#### OTHER BELMONT PRODUCT GROUPS

1. High Pressure Asbestos Packings
2. Valve Stem Packings
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10. Plastic Packings
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\*du Pont Trademark

# BELMONT

The Belmont Packing and Rubber Company • Butler & Sepviva Streets, Phila. 37, Pa.

Check 1811 opposite last page.



*You could almost paint in the rain*

*with new* **Carbo Zinc 11\***

**CARBOLINE'S NEW ZINC FILLED INORGANIC  
COATING FOR GALVANIC PROTECTION OF STEEL**

*Becomes water insoluble 20  
minutes after application*

Sudden rainfall, night condensation or rising tide will not wash it off or affect curing.

Carbo Zinc 11 is not only a new coating, it is a new *concept* in zinc filled inorganic coatings, with desirable properties not found in other protective coatings. In only 20 minutes the coating becomes insoluble in water. It can be applied directly to damp surfaces, in 90-100% humidity and at temperatures as low as 0°F.

*Only one coat* provides long-lasting galvanic protection to steel surfaces in marine, coastal and offshore environments. It is also insoluble in organic solvents, and is highly recommended for lining of solvent storage and cargo tanks. And look at its other outstanding characteristics:

- Prevents subfilm corrosion
- Excellent water, brine and solvent resistance
- Economical — low material, surface preparation and application costs
- Does not blister — cures from inside out
- No curing solution required
- Brush or spray application
- In non-immersion service, can be applied over a commercial blast, brush blast or wirebrushed surface

*Write today for complete information, technical data, uses  
and sample of this remarkable new coating—Carbo Zinc 11.*

\*Patent applied for

**carboline**  
C O M P A N Y

32-B Hanley Industrial Ct.  
St. Louis 17, Mo.

*Specialists  
in Corrosion Resisting  
Coatings and Linings*

Check 1812 opposite last page.

CHEMICAL PROCESSING

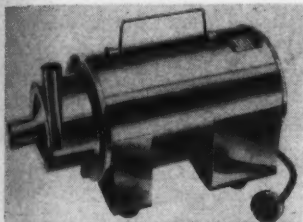
## CORROSION CONTROL

### Portable stainless pump has 50-gpm capacity

**Uses:** Pumping a wide variety of chemical solutions.

**Features:** Impeller is designed to provide capacity of 50 gallons per minute at 20 psi. Pump is constructed of 316 stainless steel throughout.

**Description:** Portable centrifugal pump weighs 30 lb,



Stainless steel centrifugal pump can handle tanks up to 1000 gal. It is easily dismantled for cleaning or service

and measures 14 x 8". Continuous-duty 3/4-hp, single-phase, 115/230v, 60-cycle motor provides power.

Pump can be furnished with any type inlet or outlet fitting. Standard inlet is 1 1/2"-OD tubing, while outlet is 1" OD and may be positioned vertically or horizontally.

(Model 101 C.I.P. stainless steel pump is a product of Stainless Steel Pump Co., 108 Wiggs St., Griffith, Ind.)

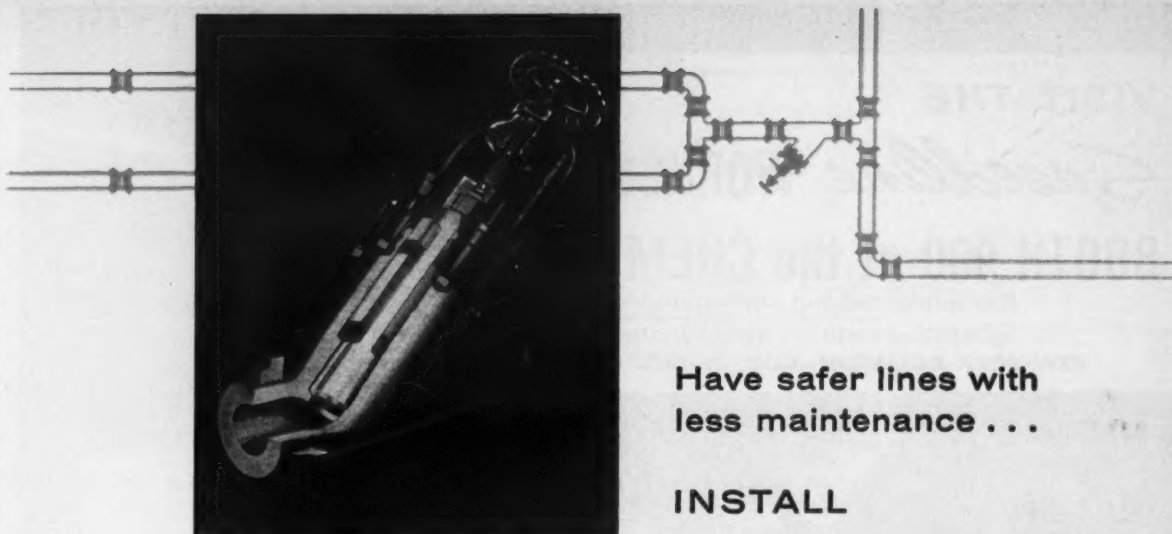
Check 1813 opposite last page.

### PVC-lined fittings up to 12" size available

Announcement is made of unplasticized polyvinyl chloride-lined steel fittings in sizes of 8, 10, and 12". Production includes 90 and 45° elbows as well as tees with flanged ends or Victaulic grooved ends. Fittings are rated for 190°F and 175 psi test pressure. They are designed for use with solid PVC pipe in Schedules 80 and 120.

(PVC-lined fittings are product of Tube Turns Plastics, Inc., 2929 Magazine St., Louisville 11, Ky.)

Check 1814 opposite last page.



Have safer lines with  
less maintenance . . .

INSTALL

**LAPP TUFCLAD®**

## SOLID CHEMICAL PORCELAIN ARMORED WITH FIBERGLASS-REINFORCED PLASTIC

The extra margin of safety essential to many process plants where protection of personnel, equipment and product is vital is assured by the bonding of TUFCLAD fiberglass-reinforced plastic to Lapp Chemical Porcelain. Strong fiberglass fabric is impregnated and bonded in multiple layers to the porcelain with an Epoxy resin of high strength and chemical resistance. It cushions accidental blows—acts as an insulator against thermal shock—and because TUFCLAD is so strong and tough, it will hold operating pressures even when porcelain is damaged by accident. Specify Lapp TUFCLAD Chemical Porcelain and enjoy the purity and corrosion resistance of a solid porcelain system with extra security from TUFCLAD armor.

Y-Valves, as shown, and Angle Valves are available in Lapp TUFCLAD Chemical Porcelain in 1/2", 1", 1 1/2", 2", 3", 4" and 6" sizes. Also safety valves, flush valves, plug cocks, pipe and fittings (to 8" diameter) and special shapes.

WRITE for description and specifications.  
Lapp Insulator Co., Inc., Process Equipment  
Division, 2106 Wendell St., Le Roy, N. Y.

**Lapp**  
**CHEMICAL**  
**PORCELAIN**



Check 1815 opposite last page.



VISIT THE

*Speedline* WORKSHOP

BOOTH 980 at the CHEM SHOW

See actual welding and expanding  
installation methods demonstrated

NEW YORK COLISEUM—NOV. 30-DEC. 4, 1959

**SEE HOW** SPEEDLINE'S  
"EXTRA LENGTH" FEATURE  
makes butt welding easier  
... less costly.

**SEE HOW** SPEEDLINE  
ALIGNING CONNECTORS  
simplify joining of light-wall  
pipe.

**SEE HOW** SPEEDLINE  
FITTINGS permit use of all  
connecting methods.

**SEE HOW** SPEEDLINE  
FLANGES reduce assembly  
costs... eliminate welding.

SEE A COMPLETE LINE OF SPEEDLINE FITTINGS FOR EVERY PROCESS PIPING REQUIREMENT

IN STAINLESS STEEL  
SCHEDULES 5 AND 10

IN ALUMINUM  
SCHEDULES 10 AND 40

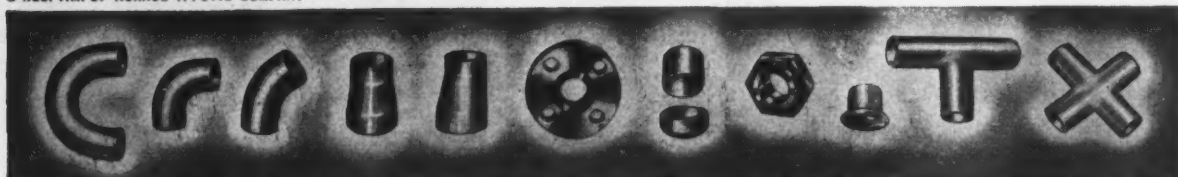
IN HASTELLOY, TITANIUM  
AND OTHER ALLOYS

DISTRIBUTORS ARE LOCATED IN PRINCIPAL CITIES FROM COAST TO COAST

*Speedline*

CORROSION-RESISTANT FITTINGS

© REG. T.M. OF HORACE T. POTTS COMPANY



A Product of HORACE T. POTTS COMPANY • 502 E. Erie Avenue • Phila. 34, Pa.

Check 1816 opposite last page.

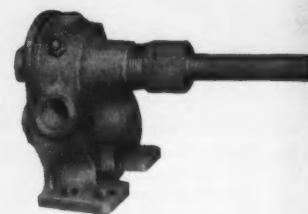
## CORROSION CONTROL

### Pump of stainless steel handles epoxy resins

**Uses:** Pumping corrosive liquids.

**Features:** So constructed that stainless steel does not contact stainless steel and Teflon does not contact Teflon ... for longer wear, increased efficiency. Can be used to pump epoxy resin at 275°F, and some types of liquid rocket fuel.

**Description:** Pump body, cover, drive gear, drive, and idle shaft are fabricated from



Gear pump is fabricated of 316 stainless steel, Teflon laminated with spun glass, and Teflon

316 stainless. Idle gear, pump body liner, and wear washers are of Teflon laminated with spun glass. Pump packing is made of Teflon.

A self-priming, positive displacement type, pump has top operating pressure of 100 psi. It is available in two sizes, 3/4 and 1 1/2". Both models have 0.836 gal per 100 rev capacities.

(SS gear pump is product of Lobee Pump & Machinery Co., Gasport, N.Y.)

Check 1817 opposite last page.



"Now what was it you were saying, Joe?"



Caustic-chlorine plant of Jefferson Chemical

## Jefferson Chemical cuts coating costs with two-coat epoxy system

**Primer is applied to all fabricated parts  
prior to arrival at plant site**

**Problem:** In the construction of its new caustic-chlorine plant at Port Neches, Texas, Jefferson Chemical Co. sought a method to keep coating costs at a minimum, yet have a well-protected plant.

Coating had to be able to withstand caustic from hot-cell liquor fumes — dilute hydrochloric acid made when chlorine picks up moisture from air — sulfuric acid — and the hot, damp salt air prevalent on the Gulf Coast.

**Solution:** Engineers decided to use a two-coat epoxy system designed to give a five-mil dry thickness in two coats, without sagging or curtaining during application.

In many areas, a two-coat system would be quite adequate in normal operation. In areas subject to more severe conditions, a third coat could be applied during normal maintenance about as easy as touching up.

From a practical financial viewpoint, application of a third coat in certain areas by a maintenance crew would be an expense item. Whereas, if a third coat were put on at time of erection, it would be a capital expenditure.

Rather than have an improper prime coat on bare steel or having it rust prior to erection — an epoxy primer was specified on all structural steel, tanks, piping, and equipment prior to arrival at plant site. Plant received excellent cooperation

from fabricators. Hence, steel was protected and high adhesion provided for finish coat.

Engineers in charge of building plant made certain paint specifications were followed. They purchased the coatings and double-checked the work in progress with a wet-film thickness gage.

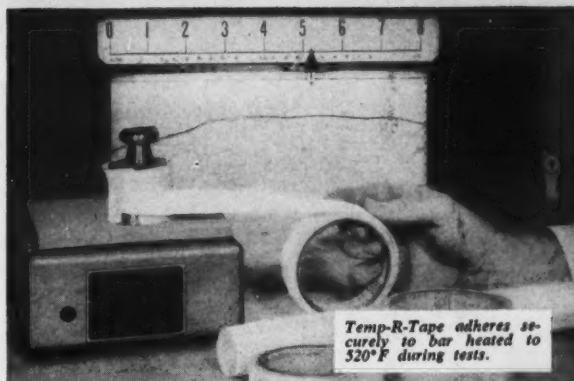
Since the epoxy was available in color, every effort was made to make the plant an attractive and cheerful place to work. Light gray, green, and white were colors employed. An off-white was used for caustic storage tanks to aid in keeping temperatures down.

**Results:** Use of two coats saved about 30% in direct labor costs, as compared to conventional three coats. A recent checkup after six months service indicates that coatings system has measured up to expectation so far. Coatings are expected to last at least four or five years, despite the chemical environment and tough weathering conditions.

(Epoxy coatings were supplied by Rowe Products Inc., College Ave. and Hyde Park Blvd., Niagara Falls, N.Y.)

Check 1818 opposite last page.

(Plant was designed and engineered by Singmaster & Breyer of New York City. Construction was carried out by their affiliate, Fluor Corporation, Ltd., Los Angeles.)



## CHR PRESSURE-SENSITIVE TEFLON® TAPES

- -100°F to 500°F applications
- Class H and Class C insulation
- Non-stick and low friction facing
- Chemical resistant facing
- Easy to apply

Temp-R-Tape is available from stock in rolls and sheets. All four types — Temp-R-Tape T; TH; C and TGV — combine some form of Teflon backing with silicone polymer adhesive to provide easy-to-apply pressure-sensitive and thermal curing pressure-sensitive tapes for electrical and mechanical applications. Designed for extreme temperatures, Temp-R-Tapes possess high dielectric strength, low power factor, high elongation, negligible moisture absorption, are non-corrosive and non-contaminating.

FREE SAMPLES and folder — write, phone or use inquiry service.

Sold nationally through distributors

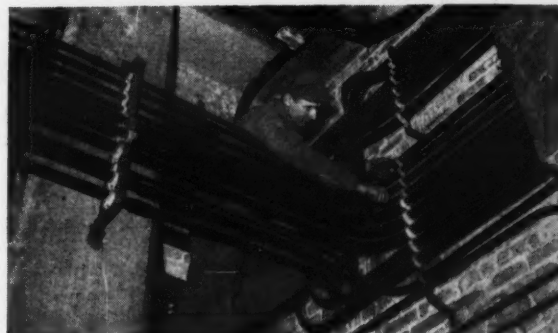


**CONNECTICUT HARD RUBBER**

\*duPont TM

Main Office: New Haven 9, Connecticut

Check 1819 opposite last page.



## Republic ELECTRUNITE "Dekoron-Coated" E.M.T. outlasts standard conduit 10 to 1



At one time, the highly corrosive atmospheres of paper making at the Charmin Paper Products Company, Green Bay, Wisconsin, combined with moisture to corrode standard conduit so badly that it had to be replaced as often as every six months. Then, Republic ELECTRUNITE® "Dekoron-Coated" E.M.T. was used. Six years later, much of the original ELECTRUNITE installation is still in service. ELECTRUNITE "Dekoron-Coated" E.M.T. costs less to install, less to maintain. Call your electrical distributor or write for FREE folder DEK-3.



Check 1820 opposite last page.





THAT'S  
INTERESTING

### Isotopes ride in wing-tips

South African Airways planes are equipped with special wing-tip compartments to carry \$28,000 worth of radioactive isotopes the Union of South Africa imports annually for medical and industrial research. Method was devised because heavy lead shielding once used made importation excessively expensive.

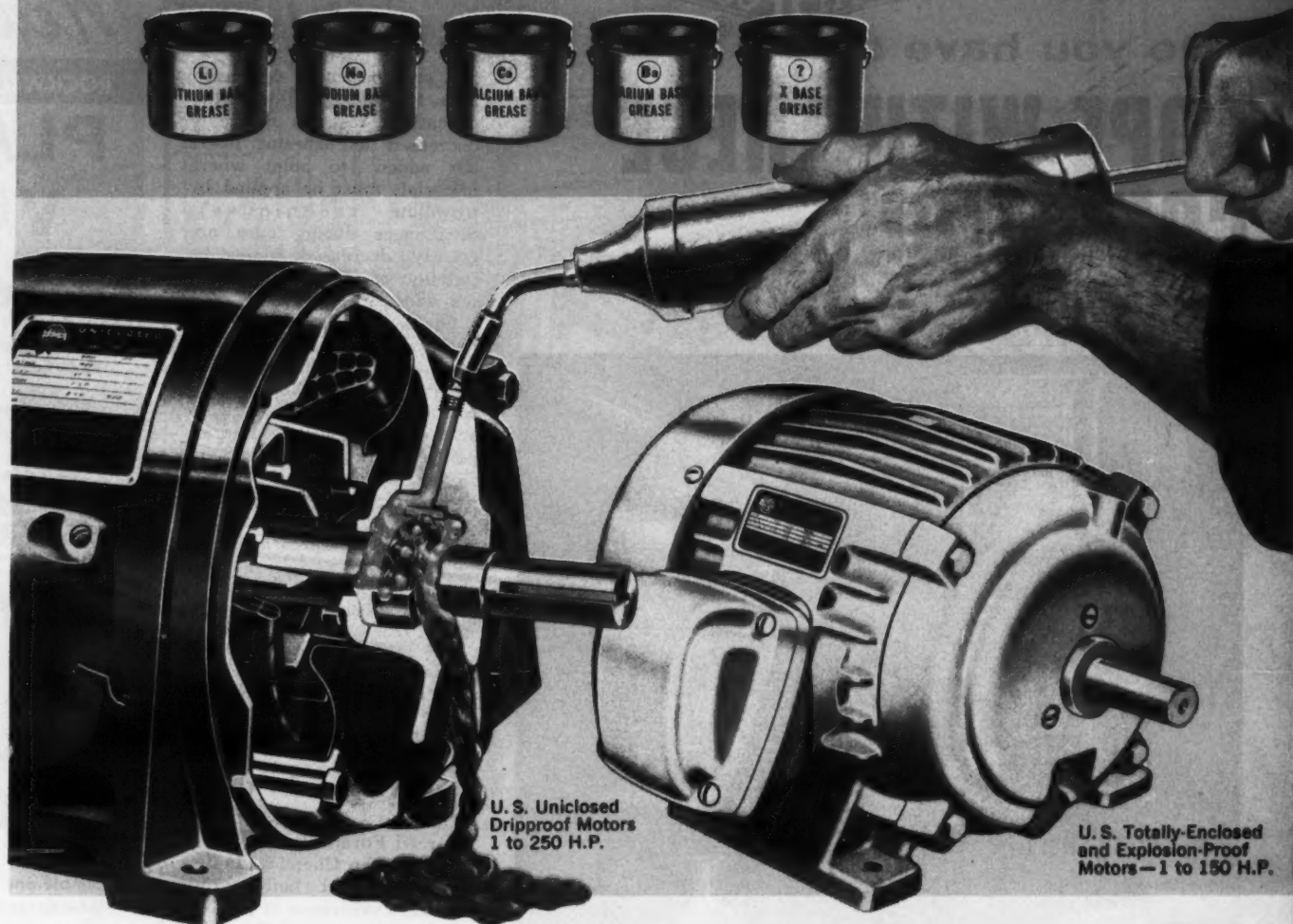
### Study-work plan expanded

University of Cincinnati this fall initiated new experiment in cooperative education. Students are combining study for their master's and doctor's degrees with basic research under fellowships sponsored by industry. This is believed to be only program of its kind in country for graduate students.

For more information on product at right, specify 1822 see information request blank opposite last page.



*modern greases are not always compatible...*



U. S. Uniclosed  
Dripproof Motors  
1 to 250 H.P.

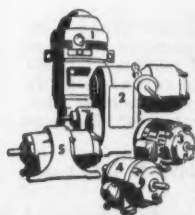
U. S. Totally-Enclosed  
and Explosion-Proof  
Motors - 1 to 150 H.P.

*...that's why it's important to assure*  
**complete flush** *with Lubriflush* \*

### \*exclusive feature of U.S. MOTORS

Today's greases have many different chemical bases - lithium, sodium, calcium, barium, and others. Some of these chemical bases react when mixed, making mixed grease unsuitable for bearing lubrication. That is why U.S. LUBRIFLUSH - an exclusive U.S. feature - is so important. With

LUBRIFLUSH transverse lubrication, new grease completely flushes out the old. No mixing! New grease may be put in without bothering to determine whether it's basically compatible with the grease already in the motor. LUBRIFLUSH, moreover, assures proper lubrication for *longest bearing life!* Another good reason to specify: "U.S. ELECTRICAL MOTORS."



**U.S. ELECTRICAL MOTORS INC.**

P. O. BOX 2058, LOS ANGELES 54, CALIFORNIA  
OR MILFORD, CONNECTICUT

U.S. MAJOR MOTOR LINES INCLUDE:  
1. Vertical Solid & Hollowshaft, 2. Varidrive, 3. Totally-Enclosed,  
4. Uniclosed, 5. Synchrogear. Also, many other special motors.

FREE COLOR BROCHURE  
...for full information send for  
FREE Lubriflush Bulletin.





# Do you have to COPE WITH THESE CONDITIONS to keep on stream?



## you combat them all with an AMPCO<sup>®</sup> METAL

What can a copper-base alloy do for you? Whatever it is, there's a grade of Ampco Metal — or other Ampco alloy — that does the job exactly.

Equally important, you can select the best, most economical form of production — fabrication, sheet, plate, tubing, pipe and fittings, extrusion, forging, sand casting, centrifugal casting.

Call in your Ampco field engineer.

**AMPCO METAL, INC.**, Dept. 130K, Milwaukee 46, Wis.  
WEST COAST PLANT: BURBANK, CALIFORNIA • SOUTHWEST PLANT: GARLAND (DALLAS COUNTY), TEXAS

Check 1823 opposite last page.

## CORROSION CONTROL

From page 120

are still basically dependent upon furane resin. Pourability of casting resin is markedly decreased as asbestos fibers are added (to point where materials must be applied by troweling techniques). Shrinkages during cure are greatly decreased—almost a function of percentage asbestos added.

Glass cloth laminates were prepared with Jet-Kote X-8 and tested according to ASTM standards. Glass fabrics described in table below are wide-open-mesh type used for construction purposes and for lining tanks. Resin contents are in vicinity of 45 to 50% by weight. Zero or contact laminating pressures were employed in preparing samples.

Flexural strength, psi:	
@ 75°F	29,000
@ 300°F	19,000
Modulus of elasticity	
in flexure @ 75°F, psi	1.9 x 10 <sup>6</sup>
Flexural strength, psi,	
after 24 hr in 150°F:	
Water	16,600
5% Sulfuric	16,000
5% NaOH	13,600

(Condensed from paper, "Reinforced Furane Resin Equipment for the Chemical Industry," delivered before 15th Annual Conference of the National Association of Corrosion Engineers by John Delmonte, President, Furane Plastics, Incorporated, 4516 Brazil St., Los Angeles 39, Calif.)

(Further information concerning furane resins may be obtained from Furane Plastics, Incorporated, 4516 Brazil St., Los Angeles 39, Calif.)

Check 1824 opposite last page.

Pipe wrap tapes made of vinyl and polyethylene and pipe wrap primer are described in six-page brochure Bul 102—Permacel, New Brunswick, N. J.

Check 1825 opposite last page.

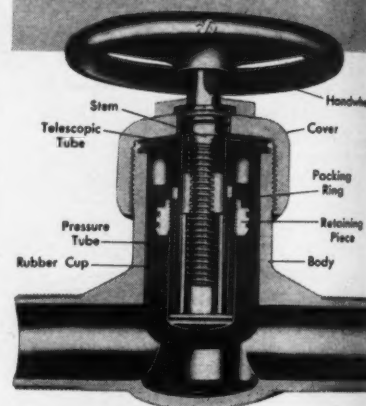
Calculator fashioned like a slide rule and easily held in the hand shows preferred materials for 247 different types of corrosives. Hoke Corrosion Chart is available from Hoke, Incorporated, 45 Piermont Rd., Cresskill, N. J.

Check 1826 opposite last page.

New

ROCKWELL-STÜBBE

## PLASTIC VALVE Solves Corrosion Problems



1. Simple one-piece body of polyethylene-acrilonitrile butadiene styrene — polyvinyl chloride — polyamide — polycarbonate or other plastics.
2. Valve shuts off TIGHT through pressure applied by telescopic arrangement to natural or synthetic soft rubber cup.
3. Straight-through design—no obstructions in full open position—no pressure loss.
4. No packing gland—no rising stem.
5. Completely vacuum tight.
6. Working pressure—125 psi.
7. Screwed, plain or flanged ends; sizes to 2 1/2".

Write for Bulletin 802.

**W. S. ROCKWELL CO.**

Valves for Industry

2209 Eliot Street  
Fairfield, Conn.

Check 1827 opposite last page.  
CHEMICAL PROCESSING



## THAT'S INTERESTING

### Lunch break learning

Researchers at Celanese Corporation of America's research laboratories go to "school" while eating lunch.

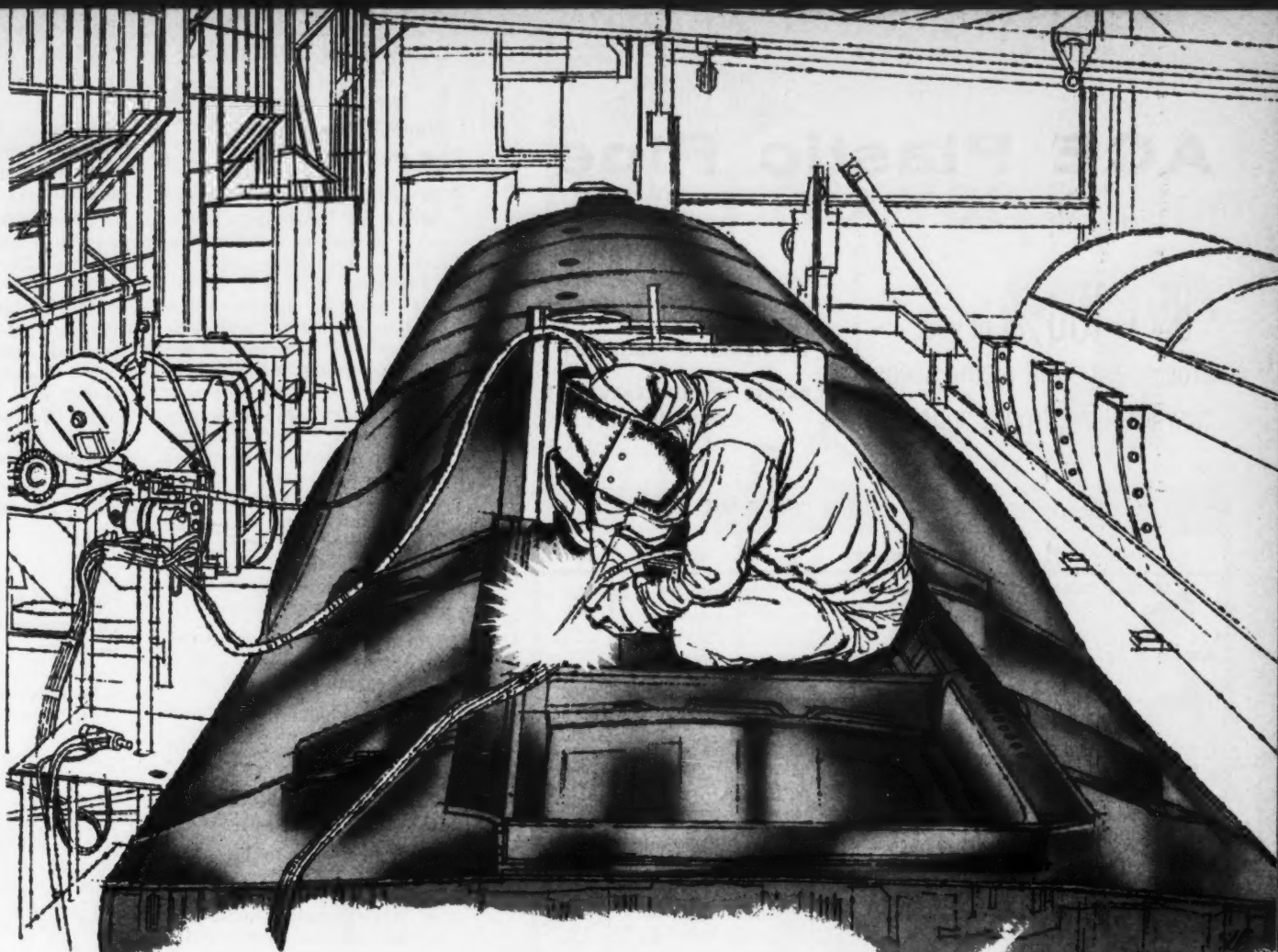
Dr. Elizabeth Barabash, literature chemist, conducts classes twice weekly during lunch hour in scientific Russian. Scholars' aim: to learn enough of the Russian language to translate scientific literature in their fields.

### Make mine rare

There's little reason to put up with tough meat any more, says Continental Food Laboratories in announcing the development of a new tenderizer.

Consisting of three enzymes, product acts on muscle, fibrous tissue and connective tissues. Company says that tenderization is complete because enzymes do not overlap.

For more information on product at right, specify 1828 see information request blank opposite last page.



## Formula for Success

The formulation of a stainless steel alloy requires as much precision as any chemical compound. All the care exercised in the selection of a particular alloy can be nullified by variations in the analysis specified.

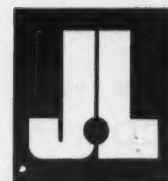
During fabrication, for example, slight differences in chromium-nickel: carbon ratios can cause changes in microstructure which lead to early failure.

That's why it is safer to specify J&L Consistent Quality Stainless Steel. J&L leads the industry in melt shop standards for stainless steel—the point where quality starts, and longer service life begins.



Plants and Service Centers:

Los Angeles • Kenilworth (N. J.) • Youngstown • Louisville (Ohio) • Indianapolis • Detroit



**STAINLESS**  
SHEET • STRIP • BAR • WIRE

Jones & Laughlin Steel Corporation • STAINLESS and STRIP DIVISION • Box 4606, Detroit 34












# ACE Plastic Pipe

85 to 100% of your  
corrosion-resistant piping needs  
now available from 1 source

- CHOICE OF 9 DIFFERENT TYPES
- THE NEWEST OF MATERIALS
- BACKED BY 100 YEARS OF EXPERIENCE

## HOW TO SELECT THE RIGHT PIPE

TYPE	SIZES	PROPERTIES	VALVES	ASK FOR BULLETIN
1 <b>ACE-ITE</b> 	Threaded Pipe 1/2 to 6"	General purpose rubber-plastic blend. Tough, impact resistant, economical. Handles most common chemicals to 170°F.	Diaphragm valves with Ace-ite body, 1/2 to 2"	80-A
2 <b>RUBBER-LINED STEEL</b> 	Flanged Pipe 1 1/2 to 24" and up	Strength of steel, resistance of hard rubber. Soft-rubber inter-layer aids shock-resistance. Finest for alkalis, most inorganic acids, many organic acids, all salts.	Rubber-lined C.I. Gate, Darling Gate & Check Valves to 24". Diaphragm Valves to 6"	CE-52
3 <b>ACE TEMPRON</b> 	Threaded Pipe 1 to 8"	Best anywhere for hot inorganic chemicals, acids, etc. to 260-275°F. Also wide variety of organics. Excellent rigidity.	---	96-A
4 <b>ACE RIVICLOR</b> 	Threaded Pipe 1/2 to 4"	Rigid PVC. Excellent aging. Good cold impact strength. Not affected by most inorganic acids and alkalis. Also good for many organics.	Diaphragm valves with Riviclor body 1/2 to 2"	CE-56
5 <b>ACE PARIAN</b> 	Threaded Pipe 1/2 to 2"	Odorless, tasteless, rigid polyethylene, best for sub-zero uses. Best resistance of any plastic at room temp. except to acetic acid.	Diaphragm valves with Parian body, 1/2 to 2"	351
6 <b>ACE HARD RUBBER</b> 	Threaded 1/2 to 4" Flanged 1 1/2 to 8"	The oldest, still tops. Extreme resistance to alkalis, inorganic acids, many organics, all salts. Ideal for chlorine, fluorine. Widest range of fittings.	Rubber-lined or plastic valves above. Also many plug valves, bibb cocks, etc.	CE-51
7 <b>ACE SARAN</b> 	Threaded Pipe 1/2 to 4" Tubing 1/8 to 1 1/4"	Odorless, tasteless, general-purpose. Strong, takes high pressures. Not affected by most inorganic acids and alkalis; resistant to most organics.	Diaphragm Valve with Saran body 1/2 to 2". Also Saran-lined diaphragm valves to 6" and up	CE-58
8 <b>ACE-FLEX</b> 	Flexible Tubing 1/8 to 1 1/4"	General-purpose transparent flexible tubing. Non-toxic, odorless, tasteless. Can steam sterilize. Excellent for chemicals.	Ace hard rubber plug valves, bibb cocks, etc.	66
9 <b>SUPPLEX</b> 	Flexible Pipe 1/2 to 2"	Non-toxic flexible polyethylene pipe. Ideal for water distribution lines, drain lines, jet wells, etc. Resistance similar to Parian. Uses insert type fittings.	Diaphragm valves with Parian body, 1/2 to 2"	CE-57



ACE Saran, Supplex, Ace-ite and Riviclor are approved by The National Sanitation Foundation for drinking water.

RUBBER AND PLASTIC LINED TANKS, PUMPS, MOLDED PARTS, ETC., FOR ANY NEED

**AMERICAN HARD RUBBER COMPANY**

Division of Amerace Corporation

ACE ROAD • BUTLER, NEW JERSEY



SEE ACE EQUIPMENT  
IN CHEMICAL  
ENGINEERING CATALOG

Check 1829 opposite last page.

## CORROSION CONTROL

### Wear resistance is high for Mn-bronze alloy

**Uses:** Long-wearing applications in bushings, gears, cams, shafts, and connecting rods.

**Features:** Alloy has excellent bearing characteristics, good machinability, and high resistance to wear and corrosion, according to manufacturer.

**Description:** Manganese-bronze alloy is extruded from continuous-cast billets, and is available from stock in variety of diameters in standard mill lengths or cut to customers' requirements.

It is considered ideal for high production runs in automatic machines.

(Ampcoloy 666 is development of Ampco Metal, Inc., 1745 S. 38th St., Milwaukee 46, Wis.)

Check 1830 opposite last page.

### Paper suggests methods to improve resistance of Zr to HCl

Recent technical paper tells of kinetic studies undertaken to further the understanding of the mechanism of corrosion of zirconium in hydrochloric acid. It was hoped that this work would lead to a clearer insight into corrosion behavior of zirconium. This would then lead to purity standards and heat-treatment procedures that will enhance the already outstanding corrosion properties of the metal.

Zirconium is believed to possess markedly superior corrosion resistance to that published in literature for hydrochloric acid environments. Availability of purer metal now from advanced processing, melting, and fabrication techniques permits realization of these improved corrosion-resistance properties.

In this research program, corrosion in HCl from 5 to 37% concentration was studied at 150° to 250°C. Corrosion rate was found to decrease with passage of time and to be influenced by hydrogen at surface.

It was found that vacuum

annealing at 1150°C for three hours reduced corrosion rate without changing corrosion mechanism.

(Condensed from technical paper, "High-temperature, High-pressure Corrosion of Zirconium in Hydrochloric Acid," which was presented at the 1959 Annual Meeting of the National Association of Corrosion Engineers in Chicago. Author is W. E. Kuhn, Supervising Engineer, Engineering Research Branch, The Carbogrundum Company, Niagara Falls, N. Y.)

Check 1831 opposite last page.

### Pipe and tank corrosion ultrasonically measured by tester

Possible accuracy of  $\pm 1\%$  of thickness measured

An ultrasonic thickness tester has been in service, measuring extent of corrosion in pipes and tanks at Marcus Hook Refinery of Sun Oil Company, since December 1958.

Inside the probe of the unit is a piezoelectric transducer which sends out continuous ultrasonic waves. These pass through wall of pipe or tank under test. Waves are reflected by opposite surface or by internal flaw.

When continuously varying frequency of ultrasonic waves equal natural resonant frequency of material under tests, bright vertical lines appear



Inside the probe of the tester is a piezoelectric transducer which sends out continuous ultrasonic waves to detect flaws

## CORROSION CONTROL

on unit's cathode ray tube. Through use of numbered transparent scales placed over tube, operator can quickly determine thickness of material being measured, to accuracy as great as within  $\pm 1\%$ , depending on individual skill.

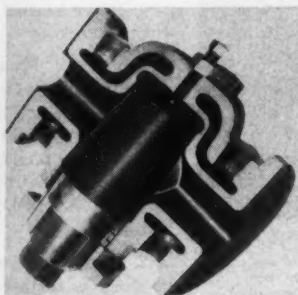
(Vidigage thickness tester 14 is product of Branson Instruments, Inc., 37 Brown House Rd., Stamford, Conn.)

Check 1832 opposite last page.

### Steel-jacketed fittings lined with Kel-F resin resist corrosion

Uses: Handling of viscous materials and other products needing jacketed fittings.

Features: Semi-steel- and steel-jacketed pipe, valves, and fittings are lined with



Cross-section of lined jacketed fitting

Kel-F to improve corrosion resistance and protect product purity and color.

**Description:** Jacketed, lined cast-iron valve or fitting performs same function as piece cast of solid alloy, but at a reasonable cost.

Lined jacketed equipment resists most acids, oxidants, alkalis, and gases up to 375°F. It will not contaminate product, and it resists adhesion of glues, resins, waxes, inks, paints, grease, rubber, and candy.

It is suitable for use over temperature range of -300 to +375°F.

(Kel-F lined jacketed equipment is manufactured by Parks-Cramer Company, Fitchburg, Mass.)

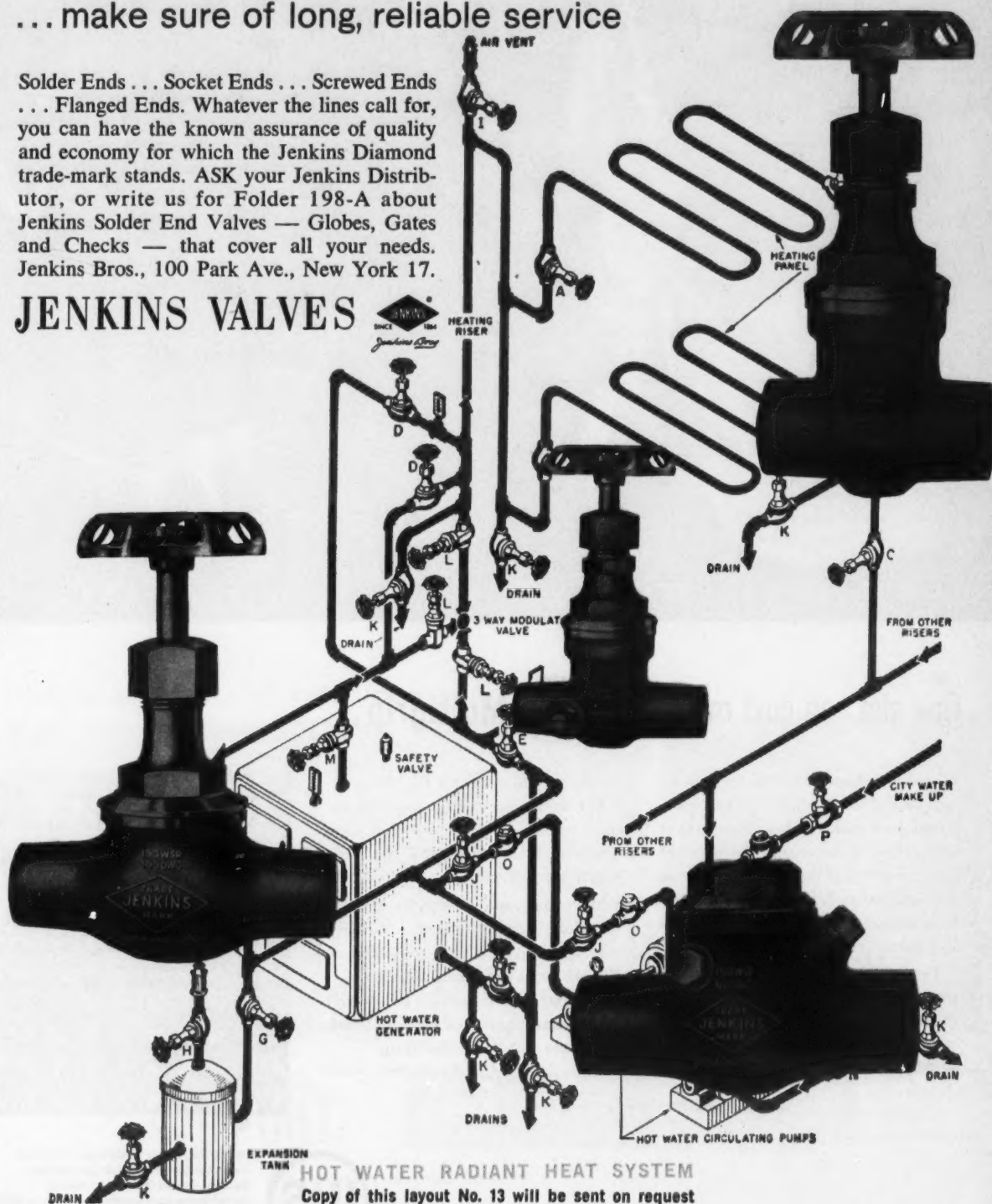
Check 1833 opposite last page.

# Look for this... on SOLDER END Valves, too

... make sure of long, reliable service

Solder Ends . . . Socket Ends . . . Screwed Ends . . . Flanged Ends. Whatever the lines call for, you can have the known assurance of quality and economy for which the Jenkins Diamond trade-mark stands. ASK your Jenkins Distributor, or write us for Folder 198-A about Jenkins Solder End Valves — Globes, Gates and Checks — that cover all your needs. Jenkins Bros., 100 Park Ave., New York 17.

## JENKINS VALVES



HOT WATER RADIANT HEAT SYSTEM  
Copy of this layout No. 13 will be sent on request

Check 1834 opposite last page.



## One slip can cost more than Multigrip...

What percentage of occupational accidents is caused by falls? In one state, falls were responsible for 17 per cent of all injuries, 33 per cent of the days lost and 23 per cent of the direct cost. (From National Safety News, February, 1959.) Falls ranked No. 1 as the cause of most accidents.

Fortunately, you can do something to prevent falls by installing USS Multigrip. Multigrip floor plate provides safe traction in any direction. It is studded with little cleats that are flat

on top and do not catch the shoe.

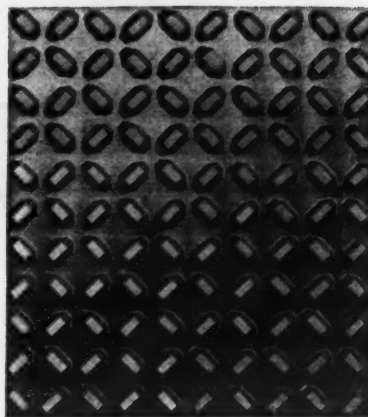
For dangerous locations such as machine shops, loading platforms, stair treads and catwalks, USS Multigrip supplies safety plus.

*Saves money, too!* Where floors take a pounding from heavy traffic, Multigrip will stand for years under constant use. There's little or no maintenance.

On your next inspection trip, search out the hazardous locations—and make them safe with USS Multigrip.

*USS is a registered trademark*

*Sold by leading distributors from coast to coast.*



United States Steel Corporation—Pittsburgh  
Tennessee Coal & Iron—Fairfield, Alabama  
Columbia-Geneva Steel—San Francisco  
United States Steel Supply—Steel Service Centers  
United States Steel Export Company

**United States Steel**



### PROBLEMS?

Interested in solving them? Want to learn new ways of improving your plant operation and, thereby, realize savings?

### In each...

issue of **CHEMICAL PROCESSING** there are articles that will help you solve many of your operational problems.

These "New Solution" stories appear in the "New Solutions" section which begins on page 33 of this issue.

This type of story is featured in other sections throughout the magazine.

They are case history stories that state the operating problem, explain how it was solved, and describe the results obtained.

"New Solution" stories cover all important phases of your operations — processing, safety, maintenance, material handling, packaging, corrosion, to name a few.

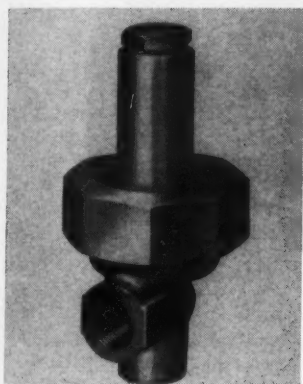


**Polyvinyl chloride valves  
made for back-pressure  
and relief service**

**Uses:** Protecting positive-displacement pumps metering dilute sulfuric acid, hydrofluosilicic acid, hypochlorite solutions, and similar process liquids from excess pressures.

**Features:** Tight shutoff below set pressure assured by special design of relief valve. Back-pressure valve maintains head on controlled-volume-pump discharge above suction pressure so liquid can be metered into low-pressure system.

**Description:** Relief and back-pressure valves have Kel-F or



Polyvinyl-chloride valve

Teflon diaphragms to protect upper internal parts from contact with corrosive liquids. Lower valve body, and the ball guide on relief valves, are fabricated of polyvinyl chloride.

Alloy seats and ball valves are available in 316 stainless steel, stainless, and Hastelloy C. Both relief and back-pressure valves are offered in 1/2 and 1/4" sizes.

Relief valve withstands pressures to 400 psi at 68°F, and to 200 psi at 140°F. Back-pressure valve withstands pressures to 200 psi at 140°F.

Internal parts can be cleaned or replaced without removing valve from the line.

(PVC relief and back-pressure valves are products of Milton Roy Company, 1300 E. Mermaid Lane, Philadelphia 18, Pennsylvania.)

Check 1835 opposite last page.

## How to cut costs and get longer service from rubber products

**Specify rubber goods made of DuPont neoprene or HYPALON®.** They outlast products made with ordinary rubber. For example:

HYPALON lined pump casings show no evidence of corrosive attack after one year service in caustic soda-chlorine manufacturing unit. Natural rubber failed within two months.

Neoprene pipe linings in cooling water return line in a refinery have served for over two years. Other linings failed within a year when exposed to water containing 18,000 ppm. salt and traces of oil.

HYPALON hose has carried hypochlorite since May, 1954. Other hose broke down in a few months.

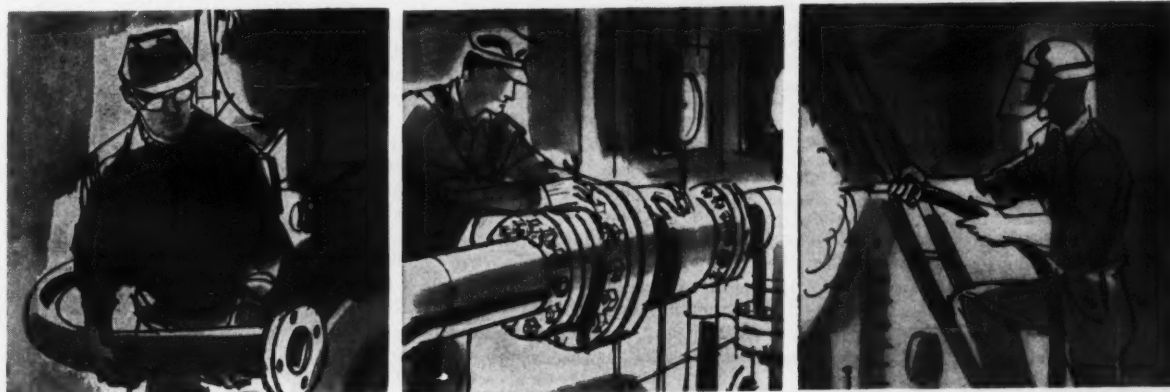
Neoprene sleeve valves have been exposed to 265° F. steam and submerged in soda ash storage tanks since 1955. Maintenance costs have been reduced.

Maintenance products of neoprene and HYPALON offer economy... longer service per dollar, reduced replacement costs, minimum downtime.

**Neoprene and HYPALON assure lasting durability** and excellent resistance to a wide range of deteriorating factors. Neoprene is a versatile synthetic rubber, with good resistance to oils and greases, most organic and inorganic chemicals. HYPALON is a special-purpose synthetic rubber which is heat-resistant, ozone-proof and impervious to most oxidizing chemicals.

**Your local rubber goods distributor** carries maintenance products of neoprene and HYPALON. He can recommend the right product to meet your needs. Call him soon. For more information write for "DuPont Elastomers in Industry," E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Dept. CP-11, Wilmington 98, Del.

## Rubber products of neoprene and HYPALON last longer



Better Things for Better Living... through Chemistry

SYNTHETIC

RUBBER

NEOPRENE  
HYPALON®  
VITON®  
ADIPRENE®

Check 1836 opposite last page.



Hose being connected to tankcar preparatory to unloading latex emulsion

Here's an outstanding example of good customer service. Resin manufacturer provided all kinds of information on changes to be made so coatings plant could receive latex emulsion in 6000-gal tankcars instead of drums

## BULK MATERIAL HANDLING SAVES COMPANY \$20,000/yr

**P**roblem: Synthetic latex emulsion received at Jamestown Finishes in 55-gal drums cost 2¼¢/lb more than it would have if received in tankcars. Additional labor was also required for handling the drum shipments. Viscosity of latex is 2500 cp; sp gr is 1.1.

**Solution:** As a customer service, manufacturer of resins provided information on ways and means coatings manufacturer might use to switch over to tankcar shipments. A brochure on various procedures that might be used was sent to customer and a representative called to discuss possible methods.

Consideration was given to installation of a corrosion-resistant tank to hold a 6000-gal shipment. However, Jamestown Finishes felt that the payout on such a tank would be longer than desired.

It was decided to make changes so that emulsion could be received in tankcars and unloaded into 55-gal drums fitted with polyethylene

liners. Four drums could then be placed on a pallet, which would be handled with a lift truck. This system would also fit in with rest of receiving operation in which material is received in bags and handled on pallets.

For entire operation it was necessary to enlarge four doorways to accommodate lift truck. Mezzanine was closed in and doorway provided. A concrete ramp was built. A 4000-lb lift truck, three hand trucks, and several hoists were purchased.

For unloading tankcars, a heavy-duty gear pump costing \$280, using a 10-hp motor costing \$450, was installed. Pump has a mechanical seal and is connected to motor with a flexible coupling. It is rated at 50-60 gpm.

Some galvanized pipe and 30' of 2"-diameter, wire-reinforced neoprene hose were purchased. Altogether about \$22,000 was spent. About half of this, or \$11,000 could be charged directly to the tank-

car unloading operation.

With present setup, a 6000-gal tankcar of resin emulsion is received about once a month and unloaded through gear pump into drums. The drums are each fitted with a three-mil polyethylene liner. Four drums are placed on a 48" square, heavy-duty oak pallet.



**GORDON WEYERMULLER**  
Associate Editor  
with **ROBERT EBERT**  
Production Manager  
Jamestown Finishes, Inc.,  
Subs. Rubbermaid, Inc.  
Jamestown, New York

After four drums on a pallet are filled, lift truck removes this pallet to warehouse. A tankcar is unloaded in six hours so no demurrage is incurred. Cars are insulated against cold.

**Results:** Bulk material handling setup permits resin to be obtained at 2¼¢/lb lower cost for a savings of about \$17,500 per year. Only about half as much labor is required as formerly, providing an additional savings of about \$2500 for a total annual savings of about \$20,000.

Jamestown Finishes now employs two men instead of nine formerly needed in receiving department. This is for entire material handling



Lift truck permits drums to be stacked three-high, effectively tripling plant's warehouse space

operation, including products received in bags.

Use of lift truck permits pallets to be stacked three high, effectively tripling plant's warehouse space.

Since plant is now able to handle material received in tankcars, it can also ship out latex in tankcars, an added service for customers of Jamestown Finishes.

(For further information on bulk material handling setup for synthetic latex emulsions contact National Starch and Chemical Corporation, 750 Third Ave., New York 17, New York.)

Check 1837 opposite last page.

(Polyethylene liners are product of Protective Lining Corp., 22 Woodhull St., Brooklyn 31, New York.)

Check 1838 opposite last page.

(Lift truck was manufactured by Hyster Co., 2902 N. E. Clackamas, Portland 8, Ore.)

Check 1839 opposite last page.

**Pouch packages formed,  
filled, and sealed  
at 200/min**

Uses: Forms, fills, and seals "four-seal" or "pillow" type pouch packages. Handles liquids, small pieces, or free-flowing powders.

Features: Output is up to 200 or more packages a minute.

Description: Machine has four filling tubes, can use printed or unprinted roll stock of most heat-sealable materials and laminations. Package size range varies, depending on package type, up to 2 3/8 x 6 3/4".

Electric-eye system provides separate registration for each web, assuring positive positioning of design that is to be on the package.

("Stokeswrap" machine is development of Stokes & Smith Plant, FMC Packaging Machinery Division, Food Machinery and Chemical Corporation, 4992 Summerdale Ave., Philadelphia 24, Pa.)

Check 1840 opposite last page.

**Conveyor belt lasts longer  
with concentric pulleys**

Uses: As pulley on belt conveyor.

Features: Concentric to within 0.030" and with perfectly smooth surface. Belt trains better, increasing its life. Closely controlled roundness helps to eliminate "hop" in pulley. Bearing life is lengthened. Method of manufacture increases yield strength 25%.

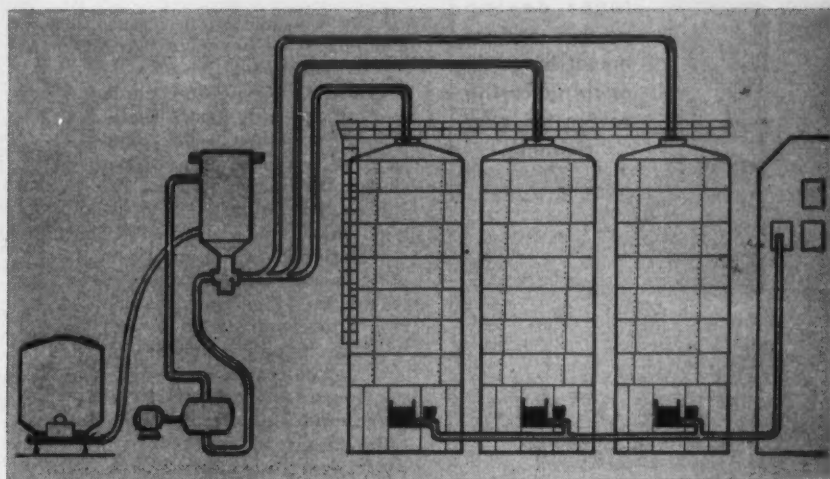
Description: Rim of welded-steel pulley is formed in die by hydro-expansion (cold-working). This toughens metal, makes it stronger. Rims and hubs are welded to end discs by submerged-arc process; pulley is moisture-proof in design.

Available in face widths to 66", diameters to 10'.

(Die Crown pulleys are described in Book 2540, available from Dept. PR, Link-Belt Company, Prudential Plaza, Chicago 1, Ill.)

Check 1841 opposite last page.

## Here's a "TRIPLE-THREAT" to the high cost of handling bulk materials



Here's a typical vacuum-pressure system for Permaglas Storage Units. A. O. Smith distributors have the "specialized" know-how to plan and help solve your bulk materials conveying problems.

## Permaglas® Storage Structures ...mechanical "sweep-arm" bottom unloader ...pneumatic conveying system

Permaglas Mechanized Storage Structures offer a "dynamic challenge" to the higher cost, conventional methods used in handling and storing of bulk materials. You can realize lower costs in your processing operations when slow and expensive methods are replaced with Permaglas Mechanized Storage Units. Equipped with the exclusive "sweep-arm" mechanical bottom unloader, they can be incorporated into an efficient pneumatic or mechanical conveying system. Here's how you benefit:

- A completely enclosed, "push button controlled" bulk materials handling system is now possible.
- Incoming "bulk" cars or trucks can be unloaded pneumatically or mechanically directly into the Permaglas Storage Structure.
- The mechanical "sweep-arm" bottom unloader

discharges bulk materials directly into the conveying system to the process lines.

• This means substantial savings in labor, eliminates bags, bins, barrels, handling equipment and the maintenance of this equipment... eliminates material losses by breakage or spillage... helps prevent hazardous accidents.

• Plus this exclusive feature. Permaglas Storage Structures are glass-fused-to-steel construction\* both inside and out. Makes possible sanitary, easy to clean bulk materials handling systems. Eliminates corrosion, safeguards products from contamination and infestation. Reduces structure maintenance to a minimum.

This low cost way to handle and store bulk materials can be accomplished with minimum capital investment. Certainly it is worth further investigation. Mail coupon for details.

Through research  ... a better way

**A.O. Smith**  
CORPORATION

HARVESTORE PRODUCTS

KANKAKEE, ILLINOIS

A. O. Smith International S.A., Milwaukee 1, Wis.

\*HYDRASTEEL—Protected by U.S. Patent No. 2,754,222

A. O. SMITH CORPORATION

Permaglas Storage Units, Dept. CP-119

Kankakee, Illinois

Send me free Permaglas Mechanized Storage Unit Bulletin MU-100.

Name.....

Title.....

Company.....

Address.....

City..... Zone..... State.....



Check 1842 opposite last page.



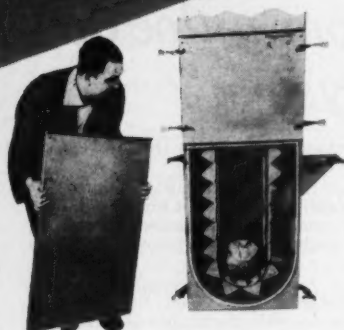
## SANITARY CENTRIFUGAL DISCHARGE CONVEYOR

Meets Municipal and Industrial sanitary standards.

Exclusive cantilever design permits total removal of quick-opening casing covers for easy cleaning.



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**NEW FREE CATALOGS**  
on Bulk Material  
**CONVEYOR**  
**ELEVATORS**  
for Process  
Industries



## SANITARY CONTINUOUS DISCHARGE CONVEYOR

Overlapping buckets provide gentle product handling.

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Summit, New Jersey

See us at the Chemical Show, Booth 1038 at the New York Coliseum, Nov. 30-Dec. 4, 1959

Check 1843 opposite last page.

## HANDLING & PACKAGING

**Conveyor counter tots up 35,000 moving items without a miss**

Boxes, cartons don't have to be spaced out

**Uses:** Counts cartons, cases, and boxes as they pass along a conveyor system.

**Features:** Accurate counts without need to space individual containers on line. Lab performance tests have shown that more than 35,000 consecutive items can be counted without a miss.

**Description:** Counting is done as each item passes over roller on the unit, which comes in 5' lengths to fit into existing handling system. This partially depresses trigger fingers, opening a circuit to generate an electrical impulse. As rear edge of item drops over the roller, a holding coil charges electric counter. After item passes over fingers, trigger returns to normal position and entire circuit resets for next count.

Accessories permit counters to be preset to deliver a specified number of items and then stop. Or it can be adapted to counting in "slugs" of a specified number of items, one after another.

(Flow Control Register is product of Rapids-Standard Co., Inc., Rapistan Bldg., Grand Rapids, Mich.)

Check 1844 opposite last page.

**Sticks paper labels fast to plastic containers**

**Uses:** Adheres paper labels to polyethylene containers.

**Features:** Reported to be fast-grabbing and to withstand extreme temperature changes and rough handling.

**Description:** Adhesive may be brushed, sprayed, or applied by conventional labeling machines . . . to flexible and semi-flexible containers. It grabs immediately on contact.

(Rubbatex polyethylene adhesive is a development of Rubba, Inc., 1015 E. 173rd St., New York, N.Y.)

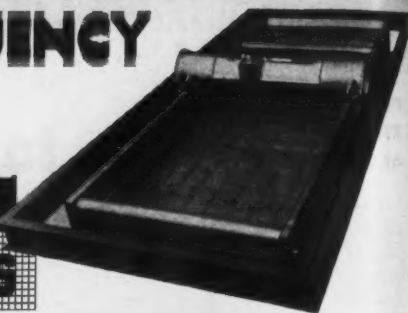
Check 1845 opposite last page.

## HIGH FREQUENCY

**Derrick**

VIBRATING MOTOR

**Screens**



## AUTOMATION SCREENING

**AVAILABLE** in SLURRY SCREENS • DRY SCREENS with dust enclosures • ELECTRICALLY HEATED SCREENS • WASHING SCREENS • Sizes up to 3 feet wide and 8 feet long. Steel or stainless steel construction.

**UNIFORM** — high speed centrifugal action produces maximum efficiency, minimum blinding.

**EFFECTIVE RANGE** — 2 to 325 mesh wet or dry.

**RUGGED** — totally enclosed vibrating motor, contamination-free . . . no exposed moving parts . . . low power requirements.

**SPACE SAVING**—heavy duty machines are quiet, flexible in design and transmit no vibration externally.

OPEN AND  
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MODEL 36-96A-4

WRITE FOR DETAILED LITERATURE

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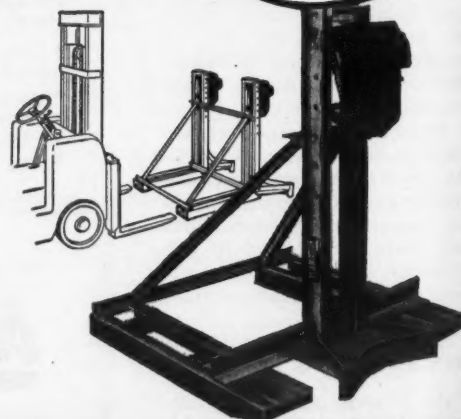
Check 1846 opposite last page.

## USE THE

**LIFT-O-MATIC**

POWER TRUCK  
ATTACHMENT

for  
**HANDLING DRUMS**  
with a  
**POWER**  
**FORK TRUCK**  
WITH FORKS  
LEFT ON  
OR  
REMOVED



Simple, automatic, mechanical handling of any size or type of drum—single or multiple.

WRITE FOR  
CATALOG

**MARVEL INDUSTRIES, Inc.**  
2234 CLEVELAND ST., EVANSTON, ILLINOIS

Check 1847 opposite last page.

CHEMICAL PROCESSING

## THAT'S INTERESTING

### Heart helper

Plastic tubing has come to the aid of heart damage patients.

A heart-lung machine using clear tubing artificially circulates and oxygenates the blood during an operation, permitting surgeons to immobilize patient's heart and lungs.

The tubing, made of a vinyl resin, is non-toxic and chemically resistant.

### Way up

A cosmic tower 62 miles high is envisioned by a Russian scientist as a vantage point to study space. Shaped like an inverted funnel, it would be built of plastic and supported by gas.

Gas-filled balloons would lift instruments to the tower's top. A huge platform atop the tower could support 190 tons of equipment.

For more information on product at right, specify 1848 see information request blank opposite last page.



**TOWMOTOR**  
THE ONE-MAN-GANG

# "Naro-Aisle-Stack" TRUCK

Stacks either side in  
6-foot aisles...



Increases storage capacity up to 35% . . . gives you an "extra warehouse" free

## Newest idea in fork lift trucks!



...also performs like  
standard lift trucks

The "Naro-Aisle-Stack" series is a Towmotor "first" that offers an entirely new mass handling technique in fork lift truck operation.

Equipped with hydraulically operated outriggers, Towmotor "Naro-Aisle-Stack" trucks perform right and left angle stacking in aisles 6 feet wide, or from four to six feet narrower than lift trucks usually require.

In addition, they also perform all of the functions of a regular fork lift truck. They pick up and lift heavy loads at speeds of 70 feet per minute. Their built-in maneuverability and pivot-action make it possible to operate in con-

gested storage areas and turn sharp corners with the agility, safety and comfort only a sit-down type truck offers.

The new Towmotor "Naro-Aisle-Stack" truck is made possible only by the use of the exclusive Towmotor Towmostatic Drive—the drive that eliminates the clutch, the transmission, the drive line, the differential and all shifting mechanism. It's a brand new idea in fast, efficient materials handling.

For complete information, write Towmotor Corporation, Cleveland 10, Ohio, and ask for folder No. F-37.

**TOWMOTOR**  
THE ONE-MAN-GANG

**-GERLINGER**

LEADERS FOR 40 YEARS IN BUILDING  
FORK LIFT TRUCKS, CARRIERS AND TRACTORS

Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation

# PROVIDES THE *Economical Solution* TO *Any Drying Problem!*


No matter what your product may be, it can be dried or otherwise processed at a lower cost per pound or other unit, in one or more of the various types of "NATIONAL" equipment.

High-speed production; maximum effective use of the drying medium under finely adjusted control; adaptability to existing plant conditions and future expansion; and the assurance of long, trouble-free operation are among the important reasons why "NATIONAL" machines are being erected in more and more chemical plants throughout the United States and in other countries.

**"P-4" CONSTRUCTION.** The result of a radically new approach to simplified Dryer construction, "P-4" Construction provides a precision-built, prefabricated structure, with trussed-and-tensioned insulated panels. It assures a more rigid, durable machine, with installation time in your plant reduced as much as 50%.

**"ADD-A-UNIT" DESIGN.** This unique accomplishment of "NATIONAL" engineering provides alternatives which are both practical and economical—(1) simplification of the initial installation based on present requirements; (2) maximum adaptability to step-by-step future expansion.

**OTHER SPECIAL FEATURES.** Patented Super-Power Fans, made in our own shops to specifications developed through years of industrial drying experience. Patented Indexing Orifices, Turning Vanes and other devices and arrangements assure unequalled versatility and precision in air distribution and control. The heat source may be steam, gas, oil or other medium.

THE  **DRYING MACHINERY COMPANY**  
LEHIGH AVE. and HANCOCK ST., PHILADELPHIA 33, PA.

New England Agent: JONES & HUNT, INC., Gloucester, Mass.  
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Be sure to visit us at  
**BOOTH No. 1112-14**  
**Twenty-seventh Exposition**  
**of Chemical Industries**  
**New York—Nov. 30 - Dec. 4**

Check 1849 opposite last page.

## HANDLING & PACKAGING

### Slide rule finds film needs for polyethylene bags

A slide rule for calculating polyethylene film and bag measurements simplifies determination of basic values such as width, length, total area, weight, and gage.

A packager, for example, need only set length and width measurements of bag he desires opposite each other on first line of rule. Second line then registers number of square feet of film required. At the same time, third line shows weight of 1000 such bags for any one of film gages ranging from 0.4 to 4 mils. All combinations of these ratios are also available.

Reverse side contains scale for determining length per pound in roll of film. This takes into account both film width (tubular and flat) and gage.

(Polyethylene bag calculator may be obtained on letterhead request to U. S. Industrial Chemicals Co., Division of National Distillers and Chemical Corporation, 99 Park Ave., New York 16, N. Y.)

### Pan- or pallet-load gets smooth ride on conveyor

**Uses:** Conveying of bulk materials on inclines or on the level.

**Features:** Pan or pallet is carried smoothly above track without pitching or twisting, even when conveyor starts, stops, or rounds curve.

**Description:** Pan or pallet is bolted directly to trolley's vertical axles.

Stability of system stems from unique design of trolley



Pan is fastened to trolley axles by clevis attachment



## HANDLING & PACKAGING

and track. Trolley has eight wheels. Four of them, on horizontal axles, roll on either the lower tracks or upper hold-down tracks. The other four wheels, on vertical axles, roll against side rails on horizontal curves. Trolleys are connected by steel rods with ball-and-socket joints.

("Chainless" conveyor is made by Conveyor Division, The American MonoRail Co., Fourth and Franklin Streets, Tipp City, Ohio.)

Check 1850 opposite last page.

### Drums, kegs palletized by automatic machine

**Uses:** Automatically palletizes four 55- or 30-gal drums or nine 120-lb kegs per pallet. Adaptable to most cylindrical containers not requiring stacking more than one tier high on a pallet.

**Features:** Reported to be simple, maintenance-free.

**Description:** All three drum and keg sizes can be handled by one drum loader with automatic or manual selection of accumulator lines. Pallet dispenser is integral part of drum loader. Operation is hydraulic, electrically controlled.

(Automatic drum palletizer is made by Beacon Machinery, Inc., PO Box 188, East St. Louis, Ill.)

Check 1851 opposite last page.



## LEADERSHIP...

The white stallion leading his band to greener pastures symbolizes the attributes of leadership . . . alertness, strength, intelligence and initiative.

Mikro-Products has established its reputation for leadership through continuing development work and extensive experience in the fields of grinding, air conveying and dust collecting. The Mikro Plan was created specifically to meet the production demands of the processing industries.

The comprehensive Mikro Plan meets the requirements of customers all over the world. It includes: MIKRO

See our exhibit—27th Exposition of Chemical Industries, New York Coliseum, Booth #632.

### MIKRO-Products

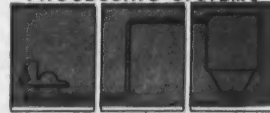
Pulverizing Machinery Division • Metals Disintegrating Company, Inc.  
60 Chatham Road • Summit, New Jersey

REPRESENTATIVES throughout the United States, Continental Europe, British Isles, Canada, Mexico, Central and South America, West Indies, South Africa, India, Japan, Philippines, Australia and New Zealand.

MANUFACTURING FACILITIES: United States, Canada, Continental Europe, British Isles.



#### PROCESSING SYSTEMS



GRINDING CONVEYING COLLECTING

ENGINEERING, which creates equipment for new uses, and improves existing methods of processing; MIKRO LABORATORY ANALYSIS, available on call to devise more effective methods of processing the customers' materials; and world-wide MIKRO SERVICE, for on-the-spot solution of problems.

Genuine Mikro replacement parts are shipped within 48 hours of receipt of the order.

MIKRO PLAN facilities are at your disposal without obligation. Call on us at any time.

Check 1852 opposite last page.

## STICKY BINS



are no  
problem  
with a

## CLEVELAND VIBRATOR



A Cleveland Vibrator keeps bulk chemicals flowing freely from any type of bin. Constant shaking breaks up arches and jams before they start. You save time, and your bins are not damaged by hammering.



AIR



ELECTRIC

Cleveland Vibrators are low in initial cost and inexpensive to operate. Cleveland manufactures both air and electrically operated vibrators. Either type will do the job; pick the one that fits best in your plant.

Write today for complete literature and prices.



Dept. 11C, 2706 Clinton Ave.  
Cleveland 13, Ohio

Check 1853 opposite last page.

## HANDLING & PACKAGING

**Feeds, opens, places bags for filling automatically at 16 bags/min rate**

**Uses:** Feeds, opens, and positions multiwall bags for filling.

**Features:** Simplified control system affords automatic operation at speeds of 16 bags/min and higher.

**Description:** Bags, 50 lb and up in wide range of dimensions, are drawn from magazine by vacuum-cup-equipped steel arm. Second similar arm moves behind bag and opens it. Opened bag is lifted by two vertical bars equipped



Automatic bag feeder

with air-operated clamps and placed on bagholder which holds it firmly during filling from overhead scale.

One master drive times all components for smooth operation. Switch activates cycling operation and speed is regulated by individual controls. Handwheel on side of unit adjusts for bag width, and rear handwheel regulates for length.

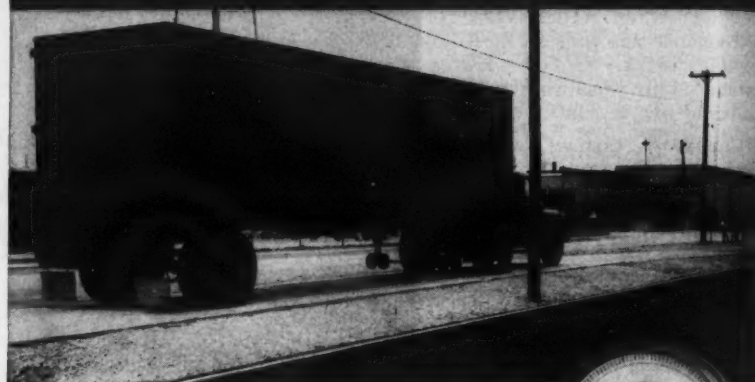
(Engineering specifications and data on Auto-Mac bag feeder are available from Packaging Service Department, Bemis Bro. Bag Co., 305-27th Ave., N.E., Minneapolis 18, Minn.)

Check 1854 opposite last page.

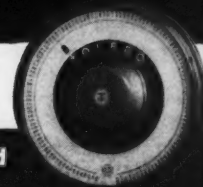
Fork-lift-truck accessories are delineated in four-page folder. Illustrates cabs, catalytic exhausts, swing-shift attachments, box dumper, various clamps and arms. Bulletin 499 — Engine-Material Handling Division, Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Check 1855 opposite last page.

## The Electronic Load Cell Brings New Versatility To TOLEDO SCALES



Now The Dial Can Be Located  
Anywhere You Want It!



The advantages of load cell operation are available in... axle load scales... motor truck scales... crane scales... hopper scales... tank scales... built-in scales... floor scales... custom test devices.

Add the flexibility of load cell operation to traditional Toledo accuracy and dependability... and you have a whole new concept of weighing ease and convenience.

Normally, the indicating element of a scale must be connected mechanically to the lever system. Not so, however, with load cell scales. You can locate the big 20" Toledo dial anywhere you want it, because only electrical connections are needed. And smooth, reliable Toledo servo action assures fast dial indicator response.

Already you may have in mind weighing or testing applications in your operations, where performance-proved Toledo load cell scales can provide new flexibility to save time, cut costs, improve efficiency.

These modern Toledos are available either as full Load Cell scales, or as Lectro-Lever scales. The latter combines a mechanical lever system with a load cell mounted in the nose iron or in the steelyard, and provides the benefits of remote indication where this combination is desired.

Toledo recording and indicating accessories are available with Toledo Load Cell Scales, including Toledo Printweigh "400" which prints full-figure weight data on tickets, strips or sheets.



Ask your Toledo representative about new Toledo Load Cell Scales for your needs. Or, SEND FOR BULLETIN 2970. TOLEDO SCALE, Division of Toledo Scale Corporation, Toledo 12, Ohio.

All Toledo Electronic platform scales have the exclusive features and superior accuracy of a self-aligning post suspension system.



**TOLEDO**  
greatest name in weighing

Check 1856 opposite last page.

CHEMICAL PROCESSING



### Moved Recently?

If you have, you will want to make sure that your copy of **CHEMICAL PROCESSING** will continue to come to you on time.

### Maybe . . .

you have received a promotion and have been transferred to a new location.

Or, if you have changed your affiliation, we want to make sure that your copies of **CHEMICAL PROCESSING** will follow you.

### Fill out . . .

the slip opposite the back cover. Be sure to answer all questions regarding your new location, title, and company.

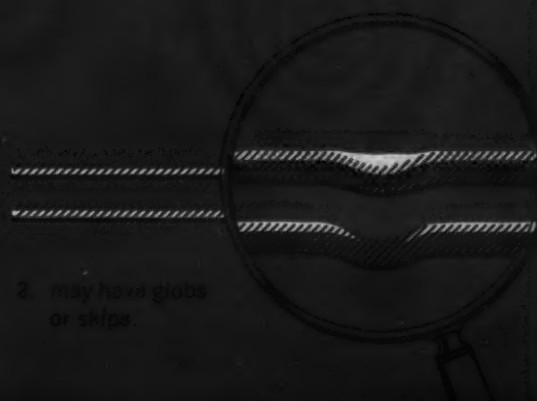
In addition, give us your former address, including company, city, state.

Mail this slip to the Reader Service Department and we will make sure you will continue to receive each issue of the magazine promptly.

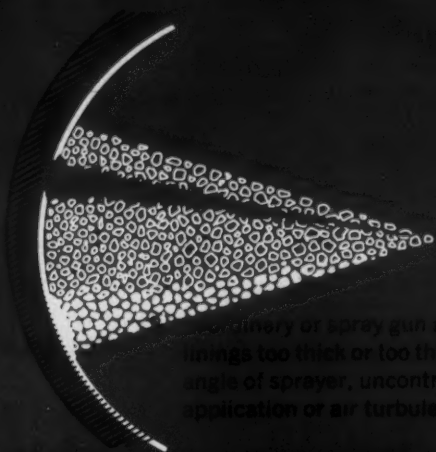
For more information on product at right, specify 1857 see information request blank opposite last page.



1. The lined drums you buy



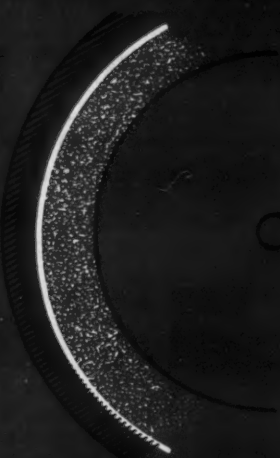
2. may have globs or skips



3. Ordinary or spray gun application, linings too thick or too thin result from angle of sprayer, uncontrolled rate of application or air turbulence.



4. Skips and globs may lead to contact between your product and bare steel, causing corrosion, contamination, customer complaints and costly losses.



5. With Rheem Centrifugal Spray, drum does not rotate. Lining quantity and application rate are controlled. The result:

**NO SKIPS  
NO GLOBS**

in drums lined by

**RHEEM  
CENTRIFUGAL SPRAY**

And that's not all. For more than three years Rheem Centrifugal Spray has been delivering lined drums free of pinholes, blisters and thin spots. Air turbulence is eliminated. Human error is eliminated. Lining thickness is controlled to within 1/10 of a mil. Linings are cured by unique Rheem Vertical Curing in three stage, high temperature ovens. For more information, or help in developing a lining for a problem product, write the world's largest manufacturer of steel shipping containers at 1701 West Edgar Road, Linden, New Jersey. Plants across the country . . . Chicago, Houston, Linden, New Orleans, Richmond, Calif.; South Gate, Calif.; Tacoma. For other sales offices see the Yellow Pages.





## One MANeuver!



**MAGLINER MOBILE LOADING RAMP**s go where you go... provide a loading dock *where* you need it, *when* you need it! Magnesium-light construction for easy one man handling—anytime, anyplace. The result: easier work, happier men... *lower cost loading!* If you load or unload trucks or railcars from ground level, you'll want a copy of Magline's Bulletin—"Everyday Ground-Level Loading Problems and How to Solve Them."

WRITE TODAY FOR BULLETIN DB-211

Magline Inc., P. O. Box 2311, Pinconning, Michigan



### MAGLINER MOBILE LOADING RAMP

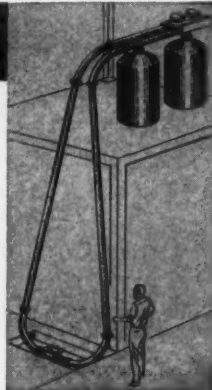
Check 1858 opposite last page.

## Hapman TUBULAR CONVEYORS for Bulk Material Handling

Move almost any flowable material wet or dry — through any plane or angle

**Sealed Pin Chain Design Keeps Abrasives Out — Quadruples Chain Life**

- Sealed casing retains liquids, gases, powders
- Basically self supporting, self feeding, self cleaning
- Degradation and cross contamination minimized
- Multiple discharge and receiving points
- Minimum space required for installation
- Functions as volumetric feeder
- Low maintenance and operating costs
- Wide range of materials available for fabrication
- ...each application engineered for your needs.



For additional information call . . . write . . . wire

**Hapman CONVEYORS, INC.**  
630 Gibson St.  
KALAMAZOO MICHIGAN  
Flareside 3-1675

See Us at Chemical Show • Booth 1358

Check 1859 opposite last page.

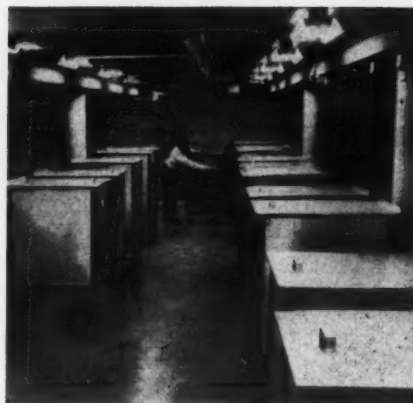
## MATERIAL HANDLING and PACKAGING



Receiver (left), bag filter (right), and blower (foreground) of suction-pressure conveyor fit within small area. Switching station to 12 storage silos is in left background

## Pneumatic conveyor pays rent of new plastic-extruding plant

Chippewa Plastics saves that much by switching to efficient clean bulk handling of resin



These 500-lb-capacity mobile hoppers receive plastic pellets by gravity from silos. Hoppers are wheeled over inlet pipes and discharge as needed to extruders half a floor below

**Problem:** Practice of receiving polyethylene resins in 50-lb bags loomed ever larger as a cost factor as production boomed at Chippewa Plastics Company, Chippewa Falls, Wis., large independent extruder. Hand-dumping of bags into extruding machinery was slow, expensive. Constant vigilance was required to maintain quality control during unloading and storage.

Things came to a head when production of polyethylene film neared one million pounds a month. Chippewa then designed a new 42,000-sq-ft plant built around a concept of low production cost and uninterrupted processing. Obviously, these outmoded, inefficient handling procedures had no place in the new facilities.

**Solution:** Resins are now received in bulk via hopper-bottom cars. They are unloaded into suction-pressure pneu-

matic-conveyor system into any of 12 storage silos. Self-cleaning action permits handling of different resins without inter-mixing.

Suction draws resin to receiver in plant. Rotary lock feeds it from receiver into flexible pressure line which may be coupled to any silo inlet by quick-disconnect coupling. A 120,000-lb-capacity car is unloaded in 10 hours.

On suction side, conveying air is filtered as it passes through hopper-car inlet filter. On pressure side, conveying air from receiver passes through bag collector before moving pellets to storage.

Remainder of handling system, planned by Chippewa engineers, moves material to process by gravity. Silos discharge into mobile 500-lb-capacity hoppers on floor below. These hoppers are then positioned above floor-level inlet pipes leading to extruders another half-floor below.

Extruded film is wound onto spools, palletized, and loaded onto railroad cars by fork-lift equipment.

**Results:** Says Chippewa vice president D. M. Nutter, "... we're saving enough through bulk purchasing and reduced labor costs to pay the rent on our new factory." Since raw materials cannot become contaminated, quality-control personnel previously checking unloading and storage have been transferred to extruding and winding processes. The pneumatic system requires only part-time attention of a shipping-department man.

Conveyor has been moving a million pounds of raw material a month since December 1958. It has proved reliable and maintenance-free.

(Airstream pneumatic-conveyor system was designed by Dracco Division of Fuller Co., 4063 E. 116th St., Cleveland 5, Ohio.)

Check 1860 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

## PAYLOADER® is more productive



## because it's more maneuverable

Never before has so much carry capacity, ease of operation and short-turning ability been combined in a tractor-shovel. That is why the model H-25 "PAYLOADER" is setting new tonnage records on boxcar unloading and other close-quarter work. "No machine you can put in a boxcar is as good as a HOUGH," says Bob Freun of Fruen Fertilizer, Hatfield, Minn.

It digs and carries 2,500 lbs. low and close with good balance and fullest operator visibility. Power-steering and only 6-foot turning radius, power-shift transmission with torque-converter drive, and powerful hydraulic brakes all assure the operator of safe, easy and accurate control. He can maneuver around corners, through narrow aisles, doorways and crowded yards, up and down ramps with speed and safety.

Your Hough Distributor is ready to show you how the H-25 can increase output at lower cost on your bulk-handling work. Contact him today or use the coupon below.

### These features give low-cost bulk handling

2,500 lbs. carry capacity • Only 6-foot turning radius • Power-shift transmission • Power steering • Power-transfer differential • 40° bucket tipback at ground • 4,500 lb. bucket breakout force • Fullest mechanical protection • Useful extra attachments

# HOUGH®

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SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

THE FRANK G. HOUGH CO.

744 Sunnyside Ave., Libertyville, Ill.

☐ Send data on H-25 "PAYLOADER"

☐ Other models to 12,000 lb. carry capacity

Name \_\_\_\_\_  
Title \_\_\_\_\_  
Company \_\_\_\_\_  
Street \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

Check 1861 opposite last page.

## PROTECTIVE'S



ALL STYLES • ALL SIZES  
Produced with fine materials:  
POLYETHYLENE, VINYL, LAMINATES  
The largest manufacturer in the U.S.A.  
concentrating on **ROUND** bottom and  
**STRAIGHT** bottom LINERS... the **FOUR**!

*\*Double-Seal Guaranteed Safety...*

# SUCCESS!

LOW, LOW, PRICES!



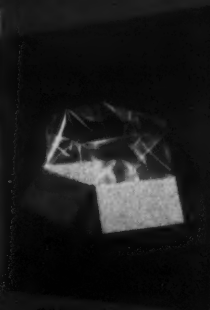
**"TWIN-SURE"  
DOUBLE-SEAL**



DRUM LINERS



BAGS



CARTON LINERS

straight bottom liners



STRAIGHT BOTTOM LINERS

... designed and  
manufactured by the pioneers  
in plastic liners for  
steel drums, flake containers,  
casks and bags...  
successfully tested and proven  
satisfactory for protective  
packaging by many of  
America's leading  
manufacturers, processors  
and laboratories.

Here are some of your  
users of protective liners:

Alcoa Chemical & Ice Corp.  
The Sargent Company  
Bioscience National Laboratories  
CO-100 Fire Equipment Company  
E. I. du Pont de Nemours & Co.  
Endicott Johnson Corp.  
General Electric Company  
Johnson & Johnson, Inc.  
National Lead Company  
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## PROTECTIVE LINING CORPORATION

GENERAL OFFICES AND PLANT: 22 WOODHULL STREET, BROOKLYN 31, NEW YORK

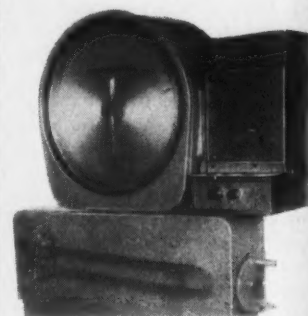
## HANDLING & PACKAGING

### Electronics tell scale's reached final weight

Avoids visual observation,  
doesn't add friction

**Uses:** Attached to manufacturer's dial scale, device electronically determines when scale has reached its true or final weight.

**Features:** Assures correct weighing without visual observation. Works quickly to sense immediately when final



Electronic weight detector on  
dial scale

weight is reached. Doesn't add friction to scale.

**Description:** Unit is designed as bridge between manually controlled and truly automatic weighing. It definitely determines that correct weight has been reached before allowing it to be recorded, read-out equipment operated, or controls for conveyors, hoppers, mixers, and other machinery to be actuated.

(Electronic weight detector is manufactured by Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.)

Check 1863 opposite last page.

### Backing truck sets level of dock ramp

**Uses:** Automatic bridging of gap between truck and dock so material-handling equipment can enter truck to load or unload. Will serve carriers from 16" above to 10" below dock level.

**Features:** Built of steel

Check 1862 opposite last page.



## HANDLING & PACKAGING

throughout and has axle-load capacity of 20,000 lb in any position and direction. Supported flush with dock level so full cross-traffic is possible when ramp is not in use.

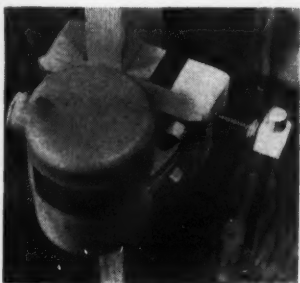
**Description:** Fully mechanical operation. Hinged ramp, built like a bridge, floats on spring scissor mechanism, or center-poise shock absorber. Cross-traffic legs provide solid base between ramp and frame when unit is not in use.

Carrier backs against arms of tubular push frame, elevator toggle cycles, and this raises ramps outside edge 16". It dwells momentarily in this position as truck continues backing, then floats down on shock absorber until lip settles on truck bed.

Ramp is 8' wide and available in lengths of 6, 8, and 10'. It can be set on four legs in front of dock, if desired, instead of recessing it into dock itself.

(Dockbridge loading ramp is product of American Dockbridge, Inc., 235 W. Oklahoma Ave., Milwaukee 7, Wisconsin.)

Check 1864 opposite last page.



### Vise-lock mounting

... speeds attachment of electric vibrator. Opening between jaws is 2½" so unit can be attached to wooden 2 x 4 as well as iron and steel structures. Vibrator delivers 275-lb punch, weighs 39 lb over-all, operates at three-phase 60-cycle current from 110 to 550 volts. All connections are water- and dust-tight.

(RC-5 electric vibrator is made by Cleveland Vibrator Company, Cleveland, Ohio.)

Check 1865 opposite last page.

# Built tough

for round-the-clock service in grueling applications



Pre-Bilt conveyors are available in belt widths of 18, 24, 30 and 36 inches. Truss and channel structural frames are designed to AISE standards for spans up to 50 ft. Supporting bents, chutes and other accessories are standardized.

### All these advantages from selection to erection with pre-engineered units

**EASY SELECTION** from standardized Link-Belt components. Your Link-Belt sales engineer will help you select the right combination.

**ON-THE-SITE QUOTATIONS** by a trained sales engineer. He will prepare a prompt quotation on all components necessary for efficient operation.

**LOW FIRST COST.** Pre-engineered, shop-assembled components, prompt delivery, fast erection time—all result in lower initial costs.

**LOW OPERATING COSTS.** Due to rugged design, maintenance normally consists only of lubrication. More economical based on cost per ton handled.

**QUICK DELIVERY.** Pre-Bilt sectional belt conveyors are manufactured and shipped from one of nine plants located nearest your operations.

**FAST, LOW-COST INSTALLATION.** Simple construction facilitates field assembly, reducing time and costs of erection.

### LINK-BELT Pre-Bilt belt conveyors bring savings from the start

Speed, economical operation and dependability—conveying features required in every industry—are provided by Pre-Bilt Sectional Belt Conveyors. They stand up in the most rugged, full-time operations. And normally the only maintenance required is lubrication.

The same engineering design which has produced some of the world's outstanding conveyor systems is applied to Pre-Belts. Standardized, shop-assembled components are selected to specifically fit your installation. Simple construction provides ease of handling and erection.

No other conveyor offers such rugged design and economy of operation in bulk materials handling. Call your nearby Link-Belt office for complete information. Or write for Catalog 2779, a new "Idea Book" for cutting costs with Link-Belt Pre-Bilt sectional belt conveyors.

# LINK-BELT

BELT CONVEYOR EQUIPMENT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarborough (Toronto 13); South Africa, Springs. Representatives Throughout the World. 15,150

Visit our exhibit, 27th Exposition of Chemical Industries, Coliseum, New York, Nov. 30-Dec. 4, Space No. 165.

Check 1866 opposite last page.

# GAYLORD PROBES THE UNIVERSE FOR PACKAGING IDEAS

A galaxy of well-equipped Gaylord researchers constantly scans the packaging world, searching out answers to container problems that seem light-years away today.

If you're shooting for the moon in your packaging operation . . . or merely want down-to-earth counsel right now . . . call your nearby G-Man today.



**GAYLORD**  
CONTAINER CORPORATION



HEADQUARTERS, ST. LOUIS  
PLANTS COAST TO COAST

DIVISION OF **Crown Zellerbach Corporation**



For  
more information  
on product at  
left, specify 1867  
see information  
request blank  
opposite last page.





## PACKAGE IDEAS

Latest developments  
in packages  
and their design



### Controlled dispensing

... in a thin stream is provided by plastic squirt cap on pint-size F-style cans. The combination plastic nozzle and captive cap, made by Garmold, Inc., can reduce total container costs by as much as \$6/thousand when compared to standard F-style can with 1" metal screw nozzle, cap, and innerseal.

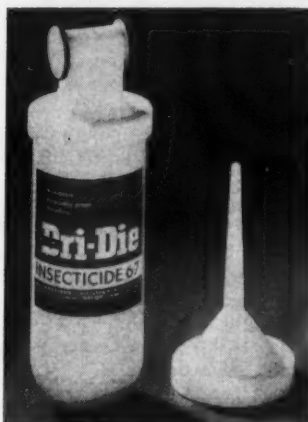
(More information on can and plastic cap package may be obtained from Continental Can Company, 100 E. 42nd St., New York 17, N. Y.)

Check 1868 opposite last page.

bag is expanding into other uses where sift-proofness, moisture retention, or prevention of moisture pickup is essential. Photo shows two-lb size used for a Du Pont weed and brush killer, and five-lb bag for a California Spray-Chemical insecticide.

(Flav-O-Tainer bag is product of Flexible Packaging Division, Continental Can Company, Devon, Pa.)

Check 1869 opposite last page.

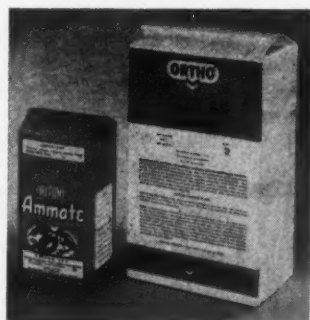


### Two-way applicator

... for insecticide powder consists of polyethylene container and two dispensing attachments. One is a long nozzle for blowing powder into spaces where general distribution is desirable. Alternate is spreading device which rolls insecticide on area accessible to insects without dispersing it generally into atmosphere.

(Davison applicator, designed for use with Dri-Die Insecticide 67, is development of Davison Chemical Division, W. R. Grace & Co., Baltimore 3, Maryland.)

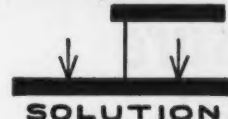
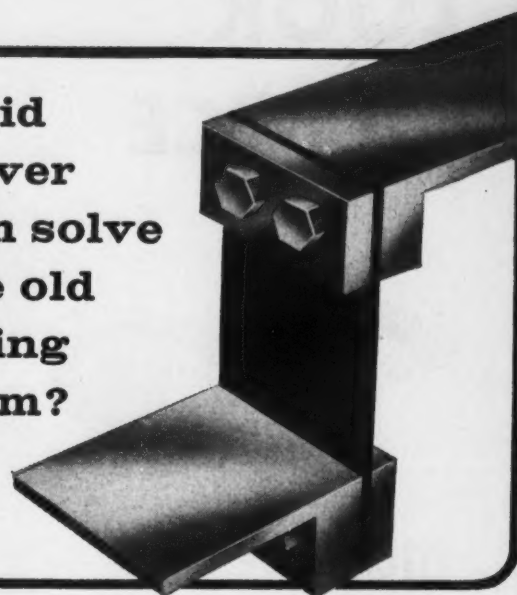
Check 1870 opposite last page.



### Sift-proof bag

... with heat-sealed construction and flat block bottom is now offered in capacities to 25 lb. Originally used as a coffee package, the automatic

How did  
this lever  
system solve  
an age old  
weighing  
problem?



Early man was aware of the progressive inaccuracies of his pivot balance scales ... but none knew how to remedy the situation.

The problem was solved in 1956 when the United States issued a patent for a "Thayer Flexure Plate" Leverage System. A team of engineers and businessmen aware of industry's tremendous cumulative loss of materials in weighing operations, had devised a revolutionary new scale.

Knife-edge pivots that progressively wear and change were replaced by Thayer Flexure Plates that move only .001", yet accurately reflect the minutest changes in weight. This firmly joined

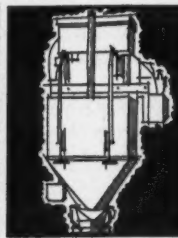
lever withstands shocks and vibrations indefinitely. Dirt and dust are no longer a problem. Thayer guarantees this leverage system accurate for the life of the scale.

### How Can It Save You Money Year After Year?

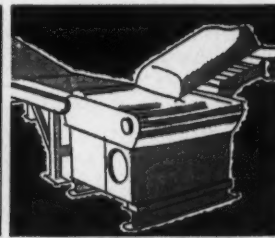
Working in conjunction with straight electrical controls, it forms the most reliable, low maintenance system ever devised to control processing or materials handling by weight. Literature on its application to filling, batching and checkweighing operations is available on request.



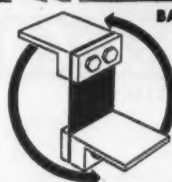
BATCHING



FILLING



CHECKWEIGHING



**THAYER SCALE**  
AUTOWEIGHTION SYSTEMS FOR FILLING,  
BATCHING AND CHECKWEIGHING

THAYER SCALE CORP.

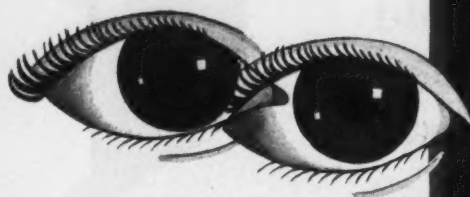
THAYER PARK

PEMBROKE, MASS.

Check 1871 opposite last page.



# LOOK TWICE



make  
sure  
it's a

## HARRISBURG CYLINDER

Of course it pays to make sure of your cylinder quality! And by specifying Harrisburg you benefit from over 50 years of leadership in the manufacture of fine seamless steel cylinders.

This leadership — and your guarantee of quality — is sustained through closely controlled production of a superior cylinder design. The location of heavy wall sections at points of maximum stress where they are most needed is made possible only by Harrisburg's hot drawing process, which produces rugged cylinders whose service life ranges up to thirty years.

Processes such as these insure your investment in cylinder utility and safety. When buying cylinders, look for Harrisburg quality.

More than a Century in Harrisburg 24, Pa.



### HARRISBURG STEEL CO.

Division of HARSCO CORPORATION



TUBES



TRANSPORTS



FLANGES



COUPLINGS

Check 1872 opposite last page.

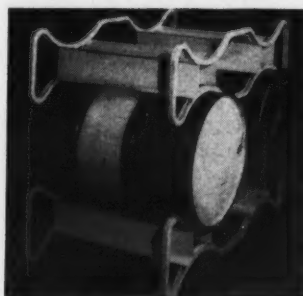
### HANDLING & PACKAGING

*Neat way to stack  
and move drums*

Fork-lift truck can take two  
from any side of rack

**Uses:** Storage and handling  
of steel drums.

**Features:** Saves space, provides safer handling with less chance of damage to drums. Efficient inventory control easier to maintain with orderly and accessible storage method. Any standard fork-



Each drum rack weighs only  
35½ lb

lift truck can pick up, move, and stack as many tiers of drums at one time as its lifting capacity permits.

**Description:** Drum racks are made of heavy-gage steel, strongly braced and welded. Each weighs only 35½ lb but will support 7500 lb of average-weight 18-ga loaded drums, 14,000 lb of average-weight 16-ga drums.

Truck can make a two-drum lift from front, back, or either side.

(Portable drum racks are made by Berger Div., Republic Steel Corp., 1038 Belden Ave. N. E., Canton 5, Ohio.)

Check 1873 opposite last page.

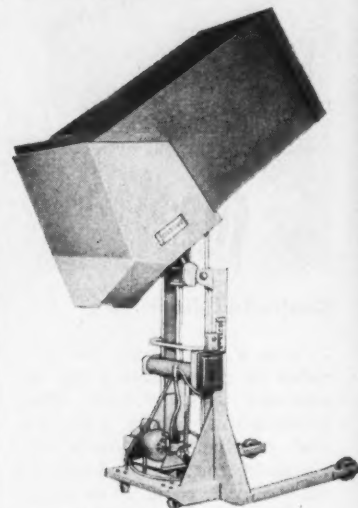
### NEXT MONTH

Hydraulic transfer of carbon black has eliminated heavy dusting situation at Refined Syrups & Sugars, Inc., Yonkers, N. Y. A December feature in this section describes the low-cost system, tells how it lends flexibility to operations. Surprisingly enough, attrition is no more than with the previous mechanical handling method.

Now...  
a Powerful New

## TUBAR DUMPER

**Specially Designed  
for Bulk Chemical  
Containers**



The new Tubar Twin-Cylinder Dumper is designed for all-purpose service in paint plants . . . pharmaceutical houses . . . granular plastics . . . and everywhere bulk chemicals are handled. It's built for years of rugged, heavy-duty service . . . cuts chemical container handling costs to the bone. Write for full information and operating specifications.

- Most models can be made portable
- Stops and holds loads at any point in dumping cycle
- Optional splash-proof and explosion-proof power features

UHRDEN is serving industry with a full line of all-purpose and special-purpose dumpers. Standard production models . . . or built to your specifications.



Check 1874 opposite last page.

CHEMICAL PROCESSING



Steam-methane reformer furnace at Best Fertilizers operates with excellent economy, using only 2-3% excess oxygen and utilizing waste heat in boiler

**cp** U.S. and WORLD  
PETROCHEMICALS

## ***Even Heat Distribution Eases Operation of Furnace***

**Permits rapid change in operating conditions  
without keeping a man on furnace  
adjusting burners**

**GORDON WEYERMULLER**, Petrochemical Editor  
with **E. L. KNICKREHM**, Ammonia Plant Supt.  
The Best Fertilizers Co., Lathrop, Calif.

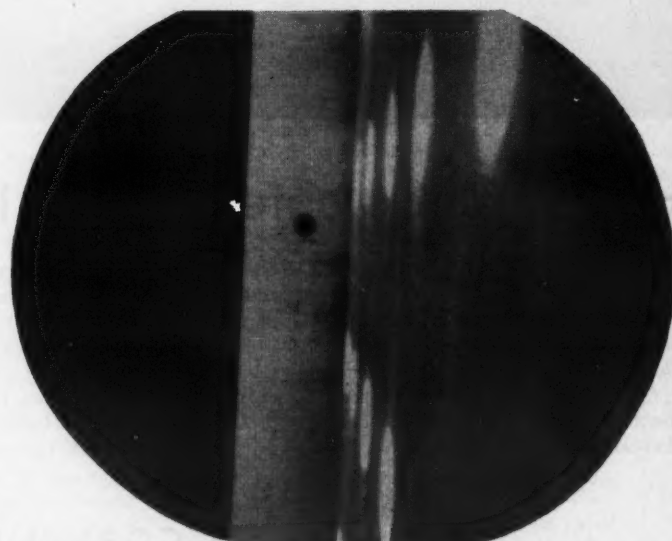
**S**team-methane reformer furnace, which has been in operation at Best Fertilizers since January 1959 producing hydrogen for ammonia synthesis, has been found to be particularly advantageous for this operation.

Furnace has performed very well. It has been operated from 25 to 110% of design flows with no serious difficulty. Greatest benefit to the plant has been the even heat distribution with no troublesome hot spots. This means rapid change of operating conditions

as warranted without having to keep a man on furnace adjusting burners. Furnace has required remarkably little attention at any time.

Plant has been able to get flue gases down to 2-3% excess oxygen quite consistently. This, together with boiler waste heat recovery, provides excellent economy. A large portion of steam requirements for furnace are furnished by this waste heat recovery. A boiler supplies startup steam.

Design furnace feed rates are 102,600 SCF/hr of natural gas and 14,600 lb/hr of steam. Design furnace heat released



View taken through peephole shows one side of furnace. Vertical tubes are at left at center of furnace and burners 2½' away in wall at right. Burners are also installed in wall on other side of tubes

is about 55 million Btu/hr. Plant has exceeded these rates by more than 10% without difficulty.

Reforming furnace operates at about 115 psig effluent pressure. It has given no difficulty at this pressure. Feed gases can go directly to furnace without recompression as utility furnishes natural gas at about 150 psig.

#### Design of Furnace

Furnace or heater is about 30' in height, 43' in inside length, and 6' in inside width. Tubes, which are 4" ID and 5" OD, contain the catalyst. They are mounted in two double rows of 41 tubes each on staggered centers.

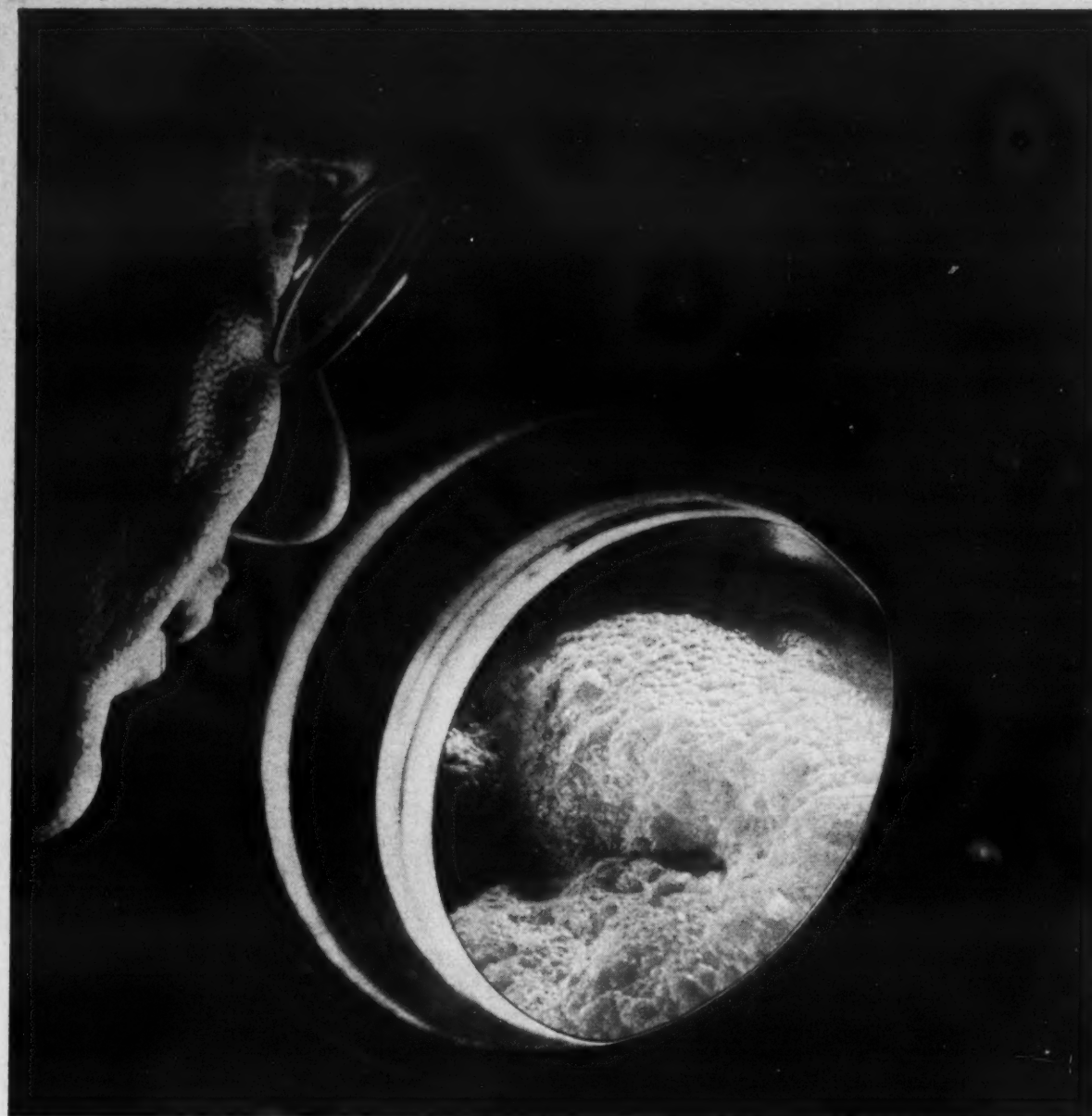
A mixture of steam and natural gas is distributed at top through a manifold system and flows downward through the tubes. Gases exit at another manifold system and are quenched.

Outlets of tubes are connected to headers by means of Incoloy pigtails. Incoloy contains 34% nickel and 21% chromium. Tube material is 310 stainless which contains 19-22% nickel and 24-26% chromium. Tubes are supported by heavy springs from top as tube expansion is upward.

Heat source in furnace is 140 radiant-type burners located in side walls. Since combustion is completed in a short time within cavity of ceramic burner cup, there is no danger of flame impingement on tubes. It is therefore possible to fire from a distance of only 2½ feet. By placing heat source close to tubes, a high percentage of heat is transferred to tubes directly by radiation. This enables tubes to respond quickly to change in heat input.

Burners are arranged in seven horizontal rows on each side of furnace, with ten burners in each row. Burners are spaced so that deviation between maximum and average heating rate at any point on tube circumference is only 15%. Variation in heating rate from hottest tube to coolest tube is only 20%. Steps have

To page 146



## How to get a safer, clearer look inside at 500°F.

This peephole is giving you a look at what happens at 500°F.—through a PYREX brand Sight Glass. Even at high temperatures, you get a safer look, a clear look—because it's a special glass.

Glass that can stand up to abrasion, thermal or mechanical shock. Glass that can stand pressures up to 300 p.s.i.

Glass that resists clouding and pitting from corrosives. Glass that stays transparent for a long service life.

You can use PYREX brand Sight Glasses to see into ovens, absorption columns, reaction kettles, furnaces, pressure vessels, evaporators, stills, or processing tanks. They're available in

a range of sizes for all applications.

Ask your regular industrial supply dealer for more information—or write us for your copy of Bulletin EB-20. It gives complete specifications of PYREX brand Sight Glasses with mounting recommendations. Corning Glass Works, 15 Crystal Street, Corning, N. Y.



**CORNING GLASS WORKS**

CORNING MEANS RESEARCH IN GLASS

Check 1875 opposite last page.



THAT'S  
INTERESTING

### Terminating termites

The Federal Housing Authority believes in beating termites to the wood.

It has listed a Shell Chemical Corporation insecticide for pre-construction treatment to protect new houses against the pests.

A mixture of the insecticide and water is put on the ground where a foundation or slab is to be built.

This enables pest control operators to provide a complete zone of protection.

### Colorful

If you think it's easy to select a color for upholstery or wall covering, try again! Just one company, Plastics Products Division of B. F. Goodrich Industrial Products Company, produces its vinyl line in 288 colors in varied patterns.

For more information on product at right, specify 1876 see information request blank opposite last page.



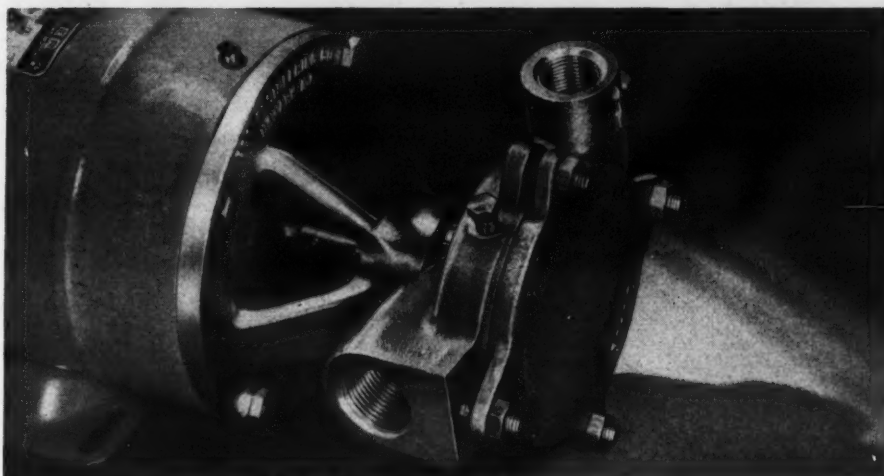
# ECO

## ENGINEERING

# NEWS

VOL. 1, NO. 5

*the big name in small pumps for the process industries*



Close-coupled motor-mounted CENTRI-CHEM Pump.

## Standard, Stock Centrifugal Pumps Handle Wide Range of Corrosive Media

Eco CENTRI-CHEM<sup>®</sup> Pumps feature Type 20 stainless steel throughout—casings, shafts and impellers—meeting a wide range of corrosion services.

### Answer Standardization Needs

These pumps were designed to meet the standardization programs of major multiplant, chemical companies, but they offer equal advantages and economies to medium sized and small plant operators, requiring small centrifugals with capacities up to 40 g.p.m.

Manufactured on a precision, mass-production basis (instead of being "custom-built" as are most other chemical-resistant pumps of this type), costs and prices are kept low. Every part is interchangeable. Pumps and repair parts are stocked for immediate delivery, by air if required

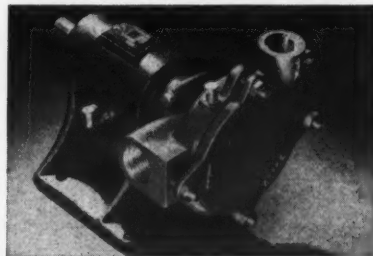
for emergency needs, guaranteeing the very minimum down-time.

### Seal is Big Feature

In every centrifugal pump, the shaft seal is usually its weakest point. The exclusive design mechanical seal used in the CENTRI-CHEM Pump has proven leak-proof under the most severe conditions. It also has handled sticky fluids for many months where other seals have gummed up and failed in minutes. Seal components to meet various exposures, include TEFLON<sup>†</sup> and ceramic, carbon and ceramic, and carbon and Type 20 stainless or Stellite.\* All seal components are interchangeable.

### New Bulletin Just Released

Write for your copy of Bulletin CT-859 which describes these remarkable pumps in detail.



Pedestal-mounted CENTRI-CHEM Pump.

## Pumping Notes

### New Electrolytically Pure Nickel GEARCHEM Pumps

No other pump line is available in so many special metals and non-metals, each with its own realm of application. The Nickel GEARCHEM<sup>®</sup> Pump is designed to prevent iron contamination of bromine and other caustics. Casings and shafts are pure nickel. Driving gears are nickel or Hastelloy<sup>®</sup> with idlers of chemically impervious TEFLON.

This metal to non-metallic gear combination permits pumping of water-thin, non-lubricating fluids without seizing, at speeds to 1750 r.p.m.

### New Phenolic Plastic Gears

#### Resist Chemicals—Wear Longer

Advancement in phenolic resin plastics technology has made great strides in recent years. Results range all the way from ultra-high temperature resisting materials suitable for rocket nose cones, to new materials which are not attacked by such widely used acids as Sulphuric, Hydrochloric and Hydrofluoric, in all concentrations and combinations. These resins are unaffected dimensionally or chemically with exposure to these acids and numerous other corrosive and problem media.

Gears generated from this phenolic plastic are now recommended for long sustained, heavy duty service in Eco GEARCHEM Pumps for such chemicals, as they have proven mechanically stronger and show minimum wear. They may be used in pairs or as idler gears in combination with metallic gears.

### Hastelloy B Pumps for Hot HCl Service

Eco GEARCHEM Pumps in Hastelloy B are expressly produced for HCl service in advanced temperature ranges (up to 160°F). Both the 3 g.p.m. and 10 g.p.m. sizes of GEARCHEM Pumps are available in this alloy.

Regularly supplied with TEFLON or carbon bearings and TEFLON, phenolic or Hastelloy B gears, and with grease-sealed extended stuffing box.

## ECO Products for Handling Corrosive and Hazardous Processing Fluids

ALL-CHEM<sup>®</sup> Rotary Pumps

MINILAB<sup>®</sup> Rotary Pumps

GEARCHEM<sup>®</sup> Gear Pumps

CENTRI-CHEM<sup>®</sup> Centrifugal Pumps

PUMPMOBILE<sup>®</sup> Portable Pumping Units

CHEMICAL DISPENSING VALVES

Factory Mutual Approved

GEAR-VAC<sup>®</sup> Valves

Ask for literature on any or all of these ECO Products

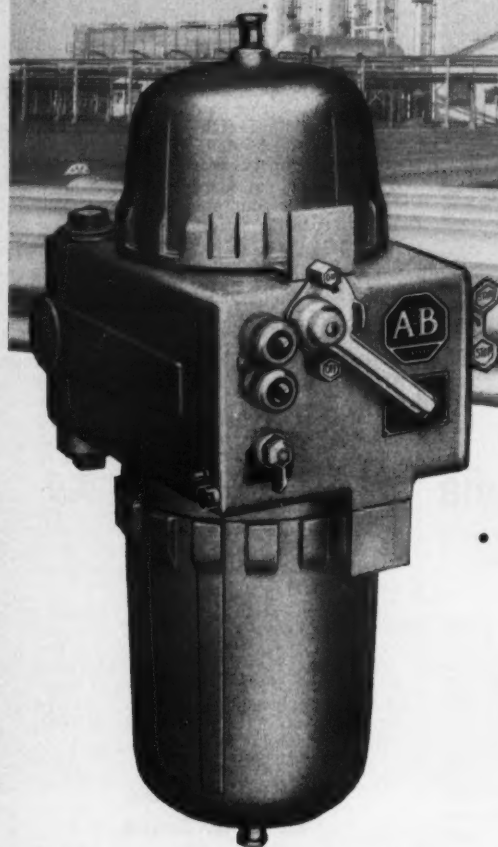
\*ECO Trademarks.

†du Pont Trademark.

®Union Carbide Trademark.

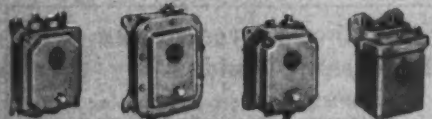
ECO ENGINEERING COMPANY • 12 New York Avenue • NEWARK 1, N.J.

# Protect your plant... and your production



Bulletin 713 combination starter in Crouse-Hinds screw type enclosure for hazardous gas and hazardous dust locations. Screw type covers permit quick access to starter or circuit breaker.

A-B enclosures are available for  
all types of installations



NEMA 4 Water-tight  
NEMA 7 For Hazardous Gas Locations  
NEMA 9 For Hazardous Dust Locations  
NEMA 11 Corrosion-proof

## ... WITH ALLEN-BRADLEY TROUBLE FREE MOTOR CONTROL

You can protect your equipment in hazardous locations with proper enclosures. But you *must also* have reliable motor control to protect your production. That's why more and more "high output" installations insist upon Allen-Bradley quality motor control.

Allen-Bradley solenoid starters have the simplest contact mechanism yet devised—there is only **ONE** moving part. Such simplicity automatically assures millions of trouble free operations. The double break, silver alloy contacts—standard throughout the A-B line—never need servicing. In addition, the permanently accurate thermal overload relays give reliable protection against dangerous overloads, no matter what the atmospheric conditions or how long the overload relays have been in service.

Protect your production while protecting your plant... specify Allen-Bradley quality... it will do this job efficiently and reliably.

# ALLEN-BRADLEY

Member of NEMA

## Quality Motor Control

Allen-Bradley Co., 104 W. Greenfield Ave., Milwaukee 4, Wis.  
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

Check 1877 opposite last page.

## PETROCHEMICALS

### Furnace Operations

From page 144

been taken to increase burner capacity at the furnace ends — where the coolest tube temperatures exist — to minimize the variations in heating rate.

With this arrangement of burners, there are seven available zones of controlled heat input. Each horizontal row can be controlled by adjusting valve regulating burner pressure.

In a typical operation, feed preheated to about 725°F enters top manifold at 150 psig. It then passes through the catalyst-filled tubes and exits at about 1425°F and 115 psig.

In order to realize the greatest efficiency for the conversion of methane to hydrogen, it is desirable to raise temperature to reforming level in as short a time as possible near top of tube coil. This can be done in this furnace by adjusting top burner rows to a relatively higher pressure. Burners in lower rows can be adjusted downwards to avoid overheating.

In a typical example, top rows of burners might be adjusted to range of 22,000 Btu/sq ft. Middle section might then be 10,000 Btu/sq ft and burners in lower two rows in range of 7000 to 8000 Btu/sq ft.

After steam-methane reformer produces crude hydrogen, gases are passed over an iron catalyst for water-shift reaction. Gases are then purified in successive steps. Synthesis gas is then made up and connected to ammonia.

After six months operation, an inspection of furnace disclosed no insulation difficulties or serious defects. Plant has had a small amount of trouble with the cast refractory burner tips. This was a relatively minor problem.

(Gradiation® furnace employing Duradiant® burners is product of Selas Corporation of America, Dresher, Pa.)

Check 1878 opposite last page.

(Plant was designed and constructed by Macco Corporation, 14409 S. Paramount Boulevard, Paramount, California.)

## THAT'S INTERESTING

### Space films

Motion pictures of the earth taken from 300 miles up show the globe and its cloud cover are a hazy white half-circle outlined against the black void of space. Movies were made by a tiny camera, crammed with 40 ft of film, which was placed in "data capsule" in nose cone of a Thor missile.

### Fast time

The idea of daylight-saving time is almost as old as the country itself. Ben Franklin thought it up, and wrote an article back in colonial days. He suggested that lighting costs could be cut if stores opened and closed earlier.

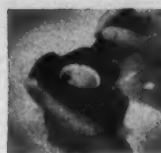
### Did you know . . .

that chemists believe there may be as many as 300 or 400 different compounds in tobacco smoke?

For more information on product at right, specify 1879 see information request blank opposite last page.



Put a Teflon® sleeve in the body



insert a plug



add a diaphragm,

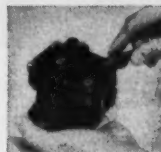


a gasket



and a thrust

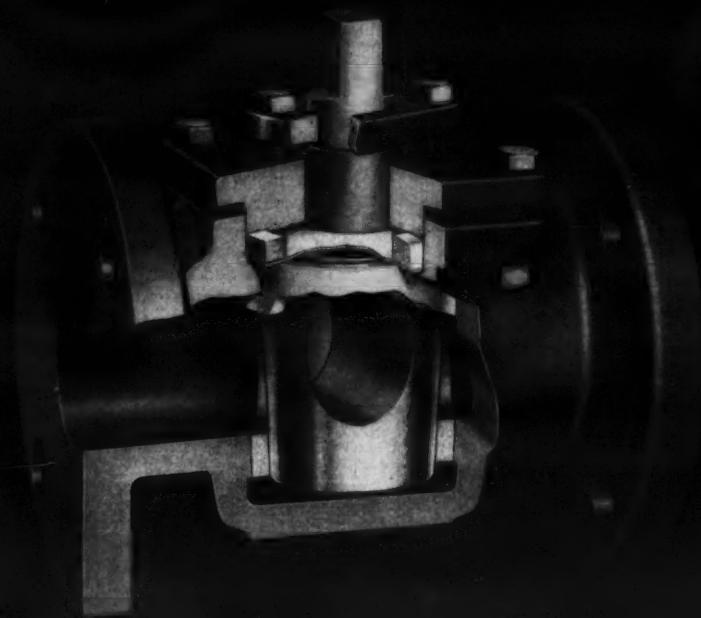
collar, secure the cap and the



self-aligning adjuster,

and you've got a non-lubricated, trouble-free plug valve.

This is the new Type G **DURCO SLEEVELINE**



*ductile or stainless  
screwed or flanged  
1/2" to 2" sizes*

*ductile flanged  
sizes to 6"*

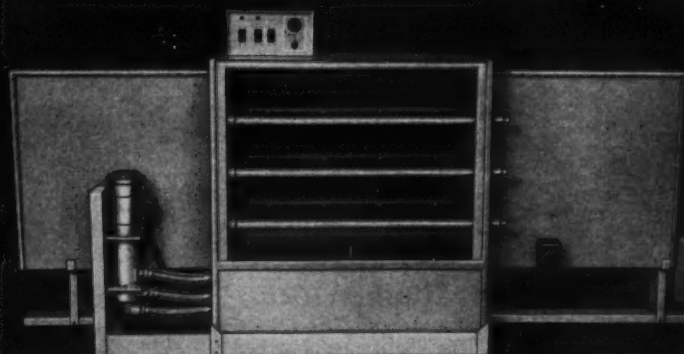
*150 psi rating  
write for Bulletin V/12*

**DURCO**

THE DURIRON COMPANY INC., Dayton, Ohio / Valves • Pumps • Filters • Process Equipment



# Unique Fabrication Shows Versatility of **VAN-COR PVC**



Production Etcher for Printed Circuits, made by Centre Circuits, Inc., State College, Pa.

To resist acid corrosion, this etcher is primarily made of Van-Cor PVC pipe, fittings, (standard and specially machined), valves, sheet (transparent and regular), and joining strips.

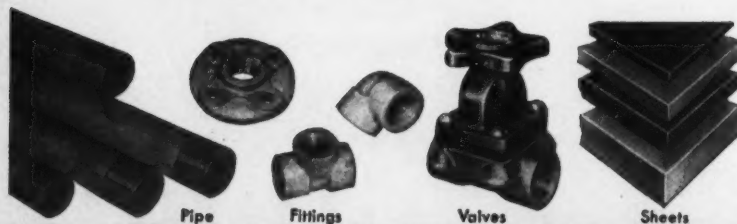
## HOW CAN VAN-COR SERVE YOU?

Van-Cor PVC has many applications for plant use, or in your end product. It is ideal for plating equipment, filters, flux spray booths, chemical treatments, bleaching operations, glass polishing, and corrosive fume handling in general.

## ADVANTAGES OF VAN-COR

1. Resists Corrosion of Industrial Acids & Alkalies
2. Light in Weight ( $\frac{1}{2}$  that of Aluminum)
3. Easily Installed; High Tensile Strength; Low Flow Resistance
4. Readily Formed, Machined, Threaded and Welded

Write for Catalog and Name of Nearest Distributor



INDUSTRIAL DIVISION OF  
**COLONIAL PLASTICS MFG. CO.**  
Subsidiary of THE VAN DORN IRON WORKS CO.  
2685 EAST 79TH STREET CLEVELAND 4, OHIO

Check 1880 opposite last page.

## PETROCHEMICALS

# Five Years Continuous Service proves stamina of Welded Heat Exchanger Tubing

Excellent performance shown in various applications  
in Texaco's Lockport refinery, where more than  
5000 electrically welded tubes are in use

GORDON WEYERMULLER, Petrochemical Editor

Excellent service in refinery and petrochemical applications involving hydrocarbons and steam up to 1000°F is being provided by electrically welded carbon steel heat exchanger tubing in use at Texaco. This fine performance record over a period of several years has dispelled the doubts that arose in the minds of engineers at the Lockport refinery about this type of tubing during World War II.

In World War II the Government had companies making welded heat exchanger tube that had not been in the field and did not have the necessary experience. For example, one bicycle manufacturer was making welded pressure tube. Non-uniformity and weakness were caused by hard places in the weld. Service obtained from this type of tube was not always satisfactory and prejudice arose against its use.

However, in 1952, engineers at Texaco in Lockport had

evidence that high-quality welded heat exchanger tube was available. For this reason they decided to make some trial installations. Welded tubing was first used for 20 bundles.

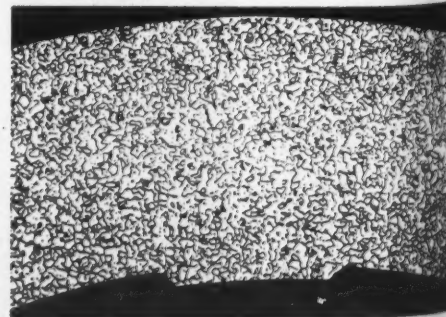
When this installation was made, careful checks were made to insure that the tube remained sound during rolling operations. Special care was taken to see that no damage was suffered at the welds.

The Lockport refinery continued to install welded tube until, by January 1954, 5000 tubes of 12' length and 869 tubes of 16' length were in service.

Since this time a great many more welded tubes have been installed at Lockport. Its use has also spread to other Texaco refineries. Company has given approval for the welded carbon steel tube to be used interchangeably with seamless tube.

At Lockport, welded tube has performed satisfactorily

Photomicrograph of welded heat exchanger tube shows how steel grain structure has been homogenized by heat treatment, providing uniformity in strength and appearance





Heat exchanger bundle ready to be installed at Lockport refinery

for up to five years continuous operation. No evidence of failure at weld has been seen. It is used for all services suitable for carbon steel.

Welded carbon steel tube provides a savings of about 10% in cost. Uniform wall thickness makes tube easy to roll with one-step operation. Heat number is marked every 40" on tube so any tube or portion of tube can be traced.

Weld bead is removed from interior of tube over entire length. This provides unrestricted flow and permits tube to be cut and used in field without need to remove weld bead. It also improves corrosion resistance.

Tubing is manufactured by the electric resistance welding method. A continuous normalizing heat treatment process is used to eliminate differences of grain structure between weld and tube body. This also provides uniform ductility for easy field fabrication, such as bending and rolling. Provision for constant power helps to make weld uniform.

In welding, a fresh edge free of rust or mechanical damage is provided seconds before weld is made. Shaping rolls are checked after each run of a size to maintain uniformity.

Immersed ultrasonic inspection has been employed the

last two years to provide a continuous check on quality of weld. When a defect shows up, an alarm circuit lights a warning lamp on oscilloscope, activates a horn at inspection station, and trips a spray gun which marks tube at location of defect.

Marked area is investigated to determine extent and type of defect. Lot of tubes involved is tagged for special checks — including magnetic particle inspection, visual inspection, and deformation tests.

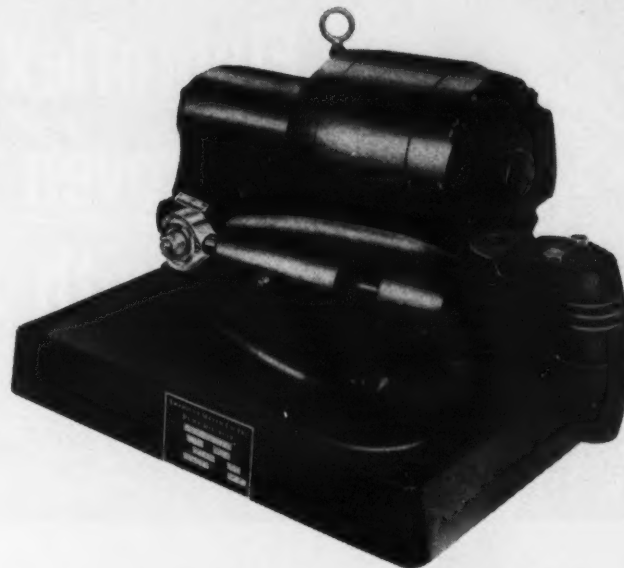
All heat exchanger tubes are subjected to hydrostatic test pressures which generally range from 1000 to 6000 psi as required. Test pressure is governed by diameter and wall thickness of tube. While on pressure, each tube is struck with a mallet to give it additional shock to disclose any possible weak spots. Final inspection includes surface examination, micrometer check of dimension, and a length check.

(For information on Lectro-sonic welded heat exchanger tube used in refineries and petrochemical plants contact The Babcock & Wilcox Company, Tubular Products Div., Beaver Falls, Pa.)

Check 1881 opposite last page.

# NEW

## American 200 Series Chemical Feed Pumps



- METERING ACCURACY OF  $\pm 1\%$
- CAPACITY TO 1624 GPH.

New 200 Series Simplex model can pump up to 812 gph. Duplex model has double this capacity. Maximum pressure of 10,000 psi.

Easy, inexpensive operation is assured by these quality features:

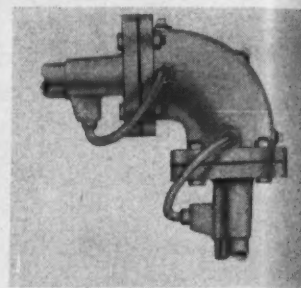
- Self-contained lubrication system — no downtime for lubrication.
- E-Z Clean Cartridge Valves simplify maintenance.
- Interchangeable liquid ends for greatest adaptability in the field.
- Precision screw adjustment on crank for easy accurate stroke regulation.
- Sealed Self-aligning bearings on crank and crosshead withstand greater radial and axial thrust loads.
- Crossheads of hardened and ground steel ride on cast iron.
- Heavy duty reducers.
- NEMA frame motors.

Precision built 200 Series pumps handle a wide variety of "tough," corrosive materials. In Chemical Processing, Refining and Boiler Feed operations, the pumps assure highest accuracy in feeding precisely metered fluids in virtually all ratios, with flow, temperature, pressure, conductivity, PH and other controlled process variables.

Write today for more information.

**AMERICAN<sup>®</sup>**  
**METER COMPANY**  
INCORPORATED (ESTABLISHED 1936)  
**pump division**  
 13500 PHILMONT AVE. PHILADELPHIA 16, PA.

Check 1882 opposite last page.



**Adapter flange**

... permits joining of product piping with integral steam tracing and heated piping systems employing jacketed valves and fittings.

Adapter flange (shown above) is one of three new components developed for use with this piping (Unitrace) which is also now available in increased maximum size.

Ninety degree elbow speeds installation where number of right-angle turns are needed. Other new component, cast flange, simplifies joining of sections. Steam jumper line may be coiled around it to provide heating.

(Unitrace and new components are manufactured by Aluminum Company of America, 1501 Alcoa Building, Pittsburgh 19, Pa.) Check 1884 opposite last page.

**Nickel-base HC catalyst can be placed on stream without preactivation**

Uses: Reforming lower molecular weight hydrocarbons.

**Features:** Catalyst doesn't require preactivation — may be placed on stream immediately upon reaching operating temperatures. Insusceptible to physical degradation by carbon formation or exposure to temperatures above 2100°F, it can be heated to 2500°F without fusing, in either reducing or oxidizing atmosphere.

**Description:** Nickel-base catalyst can be used for processing with steam, carbon dioxide, or steam and air at temperatures above 1100°F.

Low methane leakages can be obtained at normal temperatures and space velocities.

# **Fluoroflex-TS piping** **has proven performance** **with all acids**

**FLUOROFLEX-T LINER**  
Teflon® at its best—  
applied by the unique  
Resistoflex process  
at our enlarged plant  
shown above

**FLUOROFLEX-TS PIPE** is chemically inert, corrosion-proof and proven by more than two years of service in the most rugged applications. It is fabricated by a special Resistoflex process so that liner and housing are in thermal equilibrium for maintenance-free, long-life service. Liner is formed over full gasket face of the flange for continuous corrosion protection over a wide temperature range from -100°F to + 500°F.

**INCREASED MANUFACTURING FACILITIES** now in operation reflect the growing demand for Fluoroflex-TS piping. Corrosion engineers and process designers can depend on Fluoroflex-TS piping backed with full production operations by the company that originated Teflon hose and pioneered the development of Teflon lined pipe.

**FOR MORE INFORMATION...** Write for Bulletin TS-1A to Dept. 414, RESISTOFLEX CORPORATION, Roseland, N. J. Other Plants: Anaheim, Calif.; Dallas, Tex.

## **RESISTOFLEX**

*Complete systems for corrosive service*

\*Fluoroflex is a Resistoflex trademark, reg., U.S. pat. off.

\*Teflon is DuPont's trademark for TFE fluorocarbon resin.

Check 1883 opposite last page.



## PETROCHEMICALS

Concentrations of less than 0.01% in reformer effluent obtainable in production of high purity hydrogen.

Bulk density is low — 50 to 55 lb/cu ft — depending on shape and size. Catalyst is available in extrusions and rings in various sizes.

(Catalyst G-56 is development of Girdler Catalysts, Chemical Products Division, Chemetron Corporation, PO Box 337, Louisville 1, Ky.)

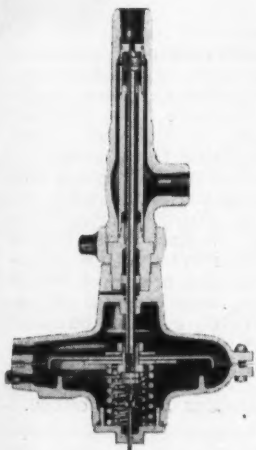
Check 1885 opposite last page.

### Heat of gases in vessel absorbed by dump valve to retard freezing

**Uses:** Liquid dump valve applications on high-pressure oil and gas separators, and other processing vessels.

**Features:** Elongated angle-style body, designed for vessel adaptation, retards freezing action by absorbing heat from gases at top of vessel.

**Description:** Control valve, which may be operated by intermitters, pressure control-



High-pressure anti-freeze dump valve

lers, and level controllers, has electric-cast steel body with pressure rating of 3000-psi WOG.

Equipped with 1" female NPT inlet and outlet connections and 2" male NPT vessel coupling connection, valve has manufacturer's standard "P" body stuffing box and bonnet

## Hey, Herman... Snap-Tite valved couplings come in big sizes too!



### There's a size and type to handle almost anything that flows

Snap-Tite can provide the right size valved coupling for most any use... with quick off-on action wherever coupling or shut-off is required.

"H" series valved couplings for high pressure applications. High resistance to heavy line surge. Sizes from 1/8" through 6". Larger sizes on special order.

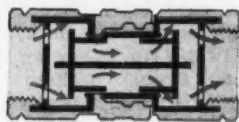
"IH" series valved couplings for greater impact in air lines. 1/8" through 1/2".

"E" series valved couplings for vacuum and very low pressure. Recommended for gravity flow. Sizes from 1/8" to 6". Larger sizes on special order.

"T" series valved couplings for hard to handle fluids. The only valved quick-disconnect couplings now on the market for fluid temperatures from -40°F to +400°F. Sizes from 1/2" through 3".

Snap-Tite valved couplings are available with two-way or one-way automatic line shut-off. They are normally furnished in alloy steel. Also available in brass, aluminum, or stainless steel with a variety of finishes.

#### TO USE SNAP-TITE VALVED COUPLING:



CONNECT—Full flow instantly



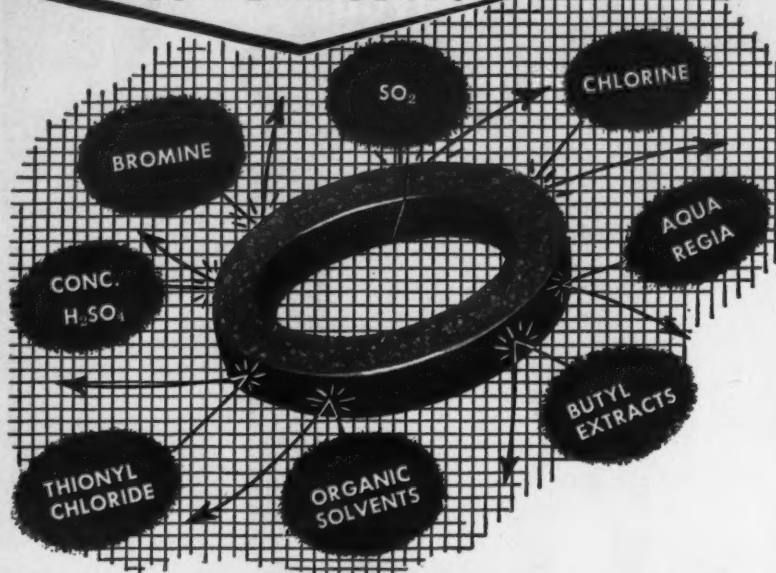
DISCONNECT—No flow instantly

Write for Snap-Tite Catalog No. 58 for more information on Snap-Tite valved couplings.

**Snap-Tite**  
UNION CITY 6, PA.

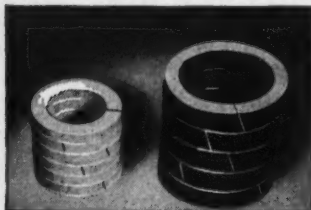
Check 1886 opposite last page.

**If you pump these  
corrosives...**



## Get months of Trouble-Free service with CHEMPRO TEFLON PACKINGS

If your pumps and valves handle highly corrosive industrial chemicals, CHEMPRO TEFLON PACKINGS will drastically cut packing replacement and maintenance costs. CHEMPRO Packings last for many months under corrosive conditions which make ordinary packings useless in days or even hours. They stop leakage by providing a tight seal at only slight gland pressure, and their very low coefficient of friction often makes lubrication unnecessary.



### TEFLON® PLASTIC STUFFING BOX PACKING

Ideal for either centrifugal or reciprocating pumps operating at speeds up to 3600 R.P.M. handling corrosives at temperatures from -118° F. to 525° F. Style No. 101 composed of 94% shredded Teflon and chemically inert graphite as a friction reducer. Style No. 201 same as No. 101 except that mica is used as friction reducer. Both styles made to fit every size stuffing box on standard process equipment.



### TEFLON V-TYPE PACKINGS

For reciprocating pumps and hand, air and motor operated valves handling corrosive materials. Lips of very sensitive pressure rings expand proportionately to increased operating pressure thereby preventing leakage. Suitable for temperatures from -150° F. to 550° F. Unsuitable for centrifugal or rotary pumps. Supplied in bulk or in complete sets to fit specific stuffing boxes.

Chemical & Power Products engineers are packing and gasket specialists with complete fabricating facilities to meet your specific requirements. Write for our complete Teflon Packing and Gasket Catalog.

\*du Pont Trademark

**CHEMICAL & POWER PRODUCTS, INC.**

The Original Fabricators of Teflon Packings and Gaskets

9 BROADWAY, NEW YORK 4, N. Y.

Check 1887 opposite last page.

## PETROCHEMICALS

nut, and inner valve and cage assembly incorporated into body.

Arrangement assures correct alignment, adequate strength, and straightforward assembly and disassembly.

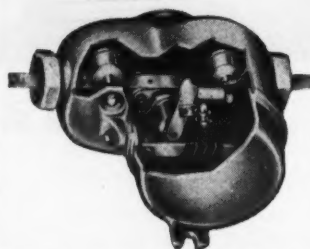
(Type 125 anti-freeze control valve is development of Fisher Governor Company, Marshalltown, Iowa.)

Check 1888 opposite last page.

### Automatic tank gaging aided by alarm control

Slack take alarm control permits immediate detection of a broken tape or abnormal slackening of tape on automatic tank gaging equipment. Hence, it lessens possibility of error. Unit can be installed in field to existing equipment.

Alarm control consists of a mercury switch held into position by an arm attached to an idler pulley that rides



Construction of alarm control  
is simple throughout

against a gage tape. Should tape break or become slack, switch will tilt to either an open or closed position. Alarms can be wired into the switch.

(Varec alarm control is product of Vapor Recovery Systems Co., Compton, Calif.)

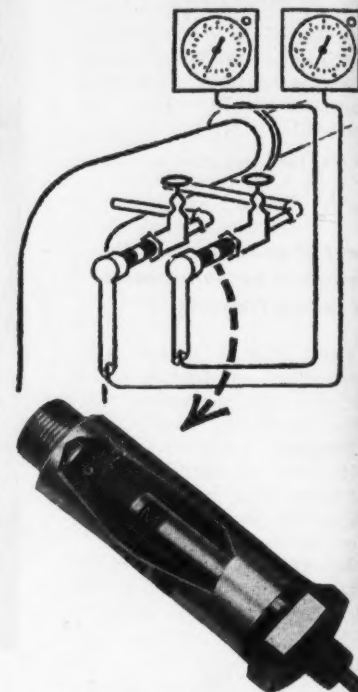
Check 1889 opposite last page.

### NEXT MONTH

Economics of steam-pyrolysis method for ethylene, which is increasingly being used by U. S. companies, will be covered in lead article for Petrochemicals section.

## MEASURING PRESSURE?

For greater accuracy  
use precision-calibrated  
SR-4® Pressure Cells



If you are measuring or controlling fluid pressure, you should know these facts about accurate, rugged SR-4® Pressure Cells. Standard accuracy:  $\pm 1/4\%$  (higher accuracies available for calibration). Calibration does not change with time. Contact fluid directly; require no external piping. Contain no moving parts. Output signal suitable for remote indication, recording or control. Widest pressure range coverage of any commercially-available transducers: 0 PSIA to 100,000 PSIG. Low line, low differential and high frequency models available. Special configurations can be provided.

Write for more information—address Dept. 16-K, and ask for Bulletin 4365

FIRST in force measurement



**BALDWIN-LIMA-HAMILTON**

Electronics & Instrumentation Division  
Waltham, Mass.

SR-4® Strain Gages • Transducers • Testing Machines

Check 1890 opposite last page.

CHEMICAL PROCESSING

## PETROCHEMICALS

### Automatic distillation of refinery products in 10 minutes

**Uses:** For testing refinery products for volatility control.

**Features:** Entirely automatic, the apparatus carries out a distillation in minutes. Reproducibility is better than by conventional methods.

**Description:** Here is how automatic distillation unit operates: Ten ml of sample to be tested is placed in a flask. Thermocouple is inserted into neck of flask and receiver is



Volatility tester

placed into position. The heater is switched on and when selected temperature is reached, an automatic cutoff turns off the heater. Volume of distillation to the nearest 0.05 ml is noted.

(BP-Hone distillation unit is product of Testing Machines, Inc., 72 Jericho Turnpike, Mineola, N. Y.)

Check 1891 opposite last page.

**Inhibitors** for the petroleum industry are covered in eight-page brochure which includes suggestions on proper selection and storage stability data. Bul 1-106—Eastman Chemical Products, Inc., subsidiary of Eastman Kodak Company, Kingsport, Tenn.

Check 1892 opposite last page.

**Reciprocating pumps** of 25 to 2400 hp, with parts in a variety of corrosion-resistant alloys, are covered in four-page bulletin. Data Sheet 100 — The Aldrich Pump Company, Allentown, Pa.

Check 1893 opposite last page.

TO FIND OUT MORE ABOUT MATCHING FITTINGS TO JOBS, VISIT B&W AT THE CHEMICAL SHOW, BOOTH 1002, COLISEUM, NEW YORK, NOV. 30th-DEC. 4th.



## B&W JOB-MATCHED WELDING FITTINGS

**make piping systems permanent and leakproof**

- ... you get positive fit-up to pipe which means welding is easier, faster and more sure
- ... you get dimensional accuracy which means that, with a sound weld, piping is maintenance-free for the life of the system
- ... you get extra long life because you can choose the correct steel for your application

Specify B&W Welding Fittings and Flanges on your next piping job. They're available in a complete range of types and sizes in carbon steel and, of course, the famous B&W CROLOYS. Call your local B&W District Sales Office or any qualified welding fittings distributor. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.



# B&W

TA 9025-WF3

THE BABCOCK & WILCOX COMPANY

**TUBULAR PRODUCTS DIVISION**

Seamless and welded tubular products, solid extrusions, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals

Check 1894 opposite last page.

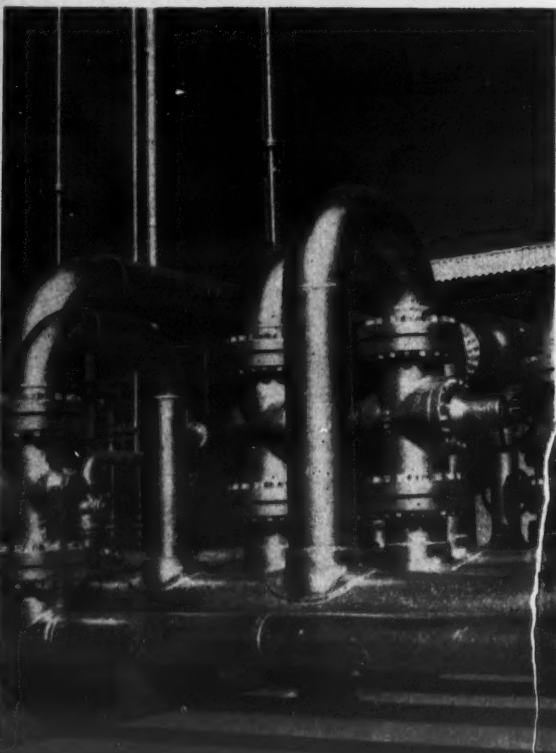
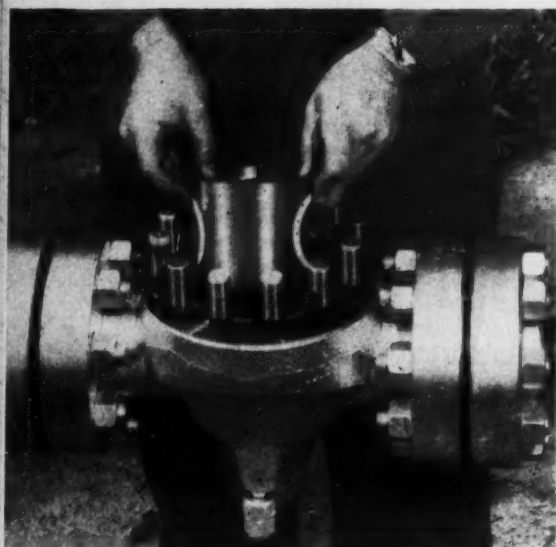




## SMOOTH DESIGN

The sealing surfaces of Cameron Non-Lubricated Lift-Plug Valves are smooth—so smooth they require no greases, no expensive lubrication program to maintain a perfect seal. They close bubble-tight on today's elusive, high pressure fluids and gases.

The unusual Cameron Lift-Plug design eliminates friction because the plug is lifted

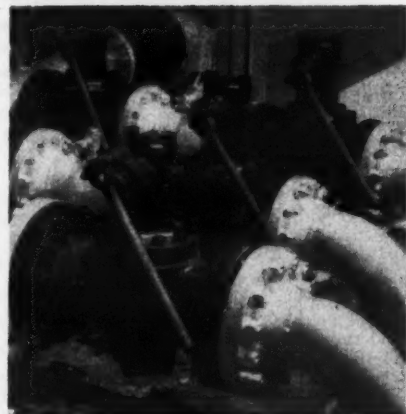
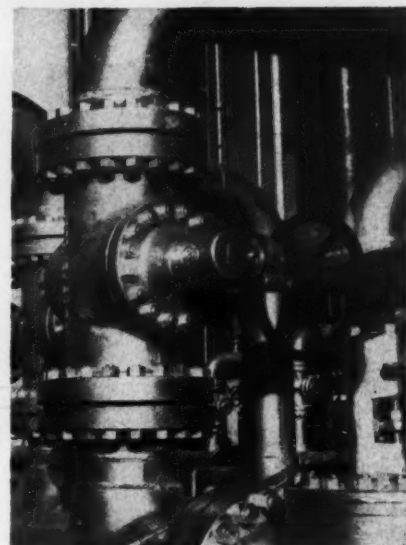


from the seat before rotating—actually never touches the seat except when completely open or closed. Unlike ordinary valves, Lift-Plugs employ a removable seat which is sealed off from the body and will not reflect pressure distortions. As an added benefit, this makes possible special trims for a wide range of services and temperatures — stainless steel for corrosives, Hycar for LPG, etc.

When repairs are finally necessary the seat and plug may be easily replaced without removing the valve from the line. Flanges and connection leaks can be eliminated by permanently welding Lift-Plugs into the line.

Last but not least, this smooth design requires far less operating torque. An easy moving cam lifts the plug from the seat, rotates it one-quarter turn and re-seats it in the opposite position. Oversize handles and cheaters are never found where Lift-Plugs are on the job.

If you are not already enjoying these benefits, call on Cameron for maintenance-free valve operation.



## DATA SAVERS!

CP's Processing and Engineering Data Section is for you!

Each month, this section contains time-saving nomographs, tables, or charts which other data savers have found extremely useful in speeding calculations. They have been sent to us by our many readers.

Perhaps, you will find them to be of value to you.

A wide variety of information can be found in this section. So, no matter what your particular field you will find suitable data to aid you in your daily work.

## And —

the section pages are designed to fit easily into regular data files.

Keep them handy for use in making quick calculations in the plant or office.

Just cut along the marked edge, punch as indicated, and insert them into your notebook.

## So —

be sure not to miss this month's "Data Section." It begins on page 49.

For more information on product at left, specify 1895 see information request blank opposite last page.



# Cameron

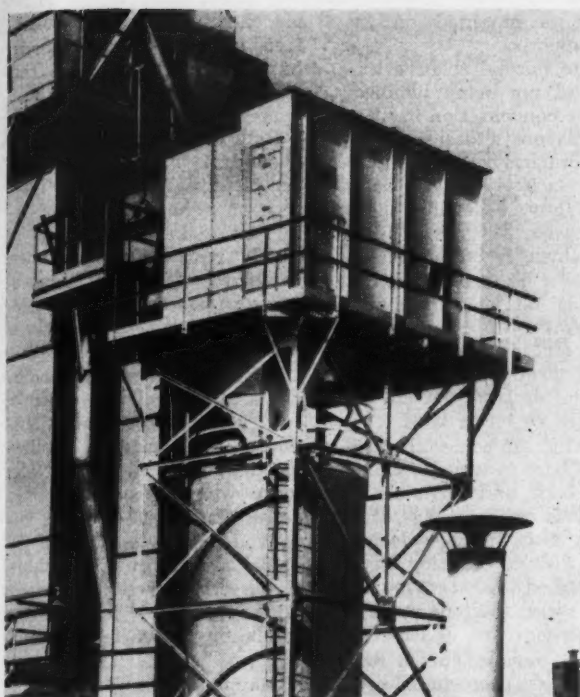
IRON WORKS, Inc.

P. O. Box 1212 — Houston, Texas

Export Office: 7912 Empire State Bldg., New York City. In England: Cameron Iron Works Ltd., 76 Grosvenor St., London W. 1 England.



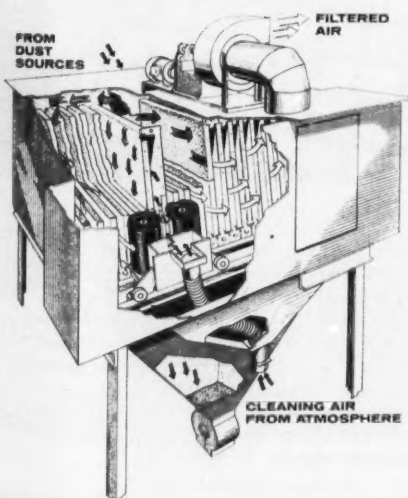
PROCESSING  
EQUIPMENT



Continuous, self-cleaning filter at Barrett plant has improved dust conditions, while requiring negligible maintenance

Talc dust conditions at Barrett roofing material plant clear up with help of . . .

## Self-cleaning Dust Filter Which Recovers Fine Talc



Here's how dust filter "cleans itself" without taking it out of line. Resilient rubber rolls seal off two filter bags on either side of bag being cleaned

**Problem:** During one stage of continuous manufacture of granule-coated composition roofing at Allied Chemical Corporation's Barrett Division plant in Birmingham, Ala., powdered talc is applied to underside of sheet. Excess tended to drop or sift off as sheet moved on. This created an undesirable dust condition.

**Solution:** A dust-control system, including local exhaust ventilation and self-cleaning dust-recovery unit, was installed. Temperature of air handled through system is approximately 80°F. Asphalt-fume content is low and relative humidity is approximately 65%.

Talc dust in work area around roofing machine is picked up by exhaust-ventilation hood over talc-application roll. It is drawn into hood by filter exhaust fan. Dust travels to filter through fabricated black-iron, all-welded pipe system. Dust halted by filter cloth is returned to talc-storage tank by means of continuous-discharge valve at base of filter hopper.

Complete dust filter has overall length of 13'. This includes filter proper and 7' fan house on right-hand end. Filter



Here's Proof . . .

Comparison of Toteline molded fiber glass tray, left, and metal tray, right, at American Cyanamid Co. shows how corrosive chemical intermediates have eaten holes in metal tray. Fiber glass tray is unaffected.

Savings of about \$8,000 a year were reported by American Cyanamid Co. after plants at Boundbrook, N.J., and Willow Island, W. Va., introduced 1,000 Toteline trays for handling dye intermediates, pigments and corrosive chemicals.

Toteline trays replaced enameled steel trays which were fragile, required special handling, chipped, flaked and caused contamination. Replacing steel trays cost \$16,000 a year.

Toteline trays cut replacement costs in half, saving \$8,000 a year. They resist non-oxidizing acids, corrosive salts, weak alkalis and many other chemicals. They are lighter than aluminum, do not rust or chip. The smooth, uncoated surfaces do not contaminate contents and the trays are stronger than steel on a strength-weight basis.

If your company wants to make savings like American Cyanamid, investigate what Toteline trays can do for you. Just clip, fill in and mail the attached coupon for further information.

by **TOTELINE**

**MOLDED FIBER GLASS TRAY CO., LINESVILLE, PA.**

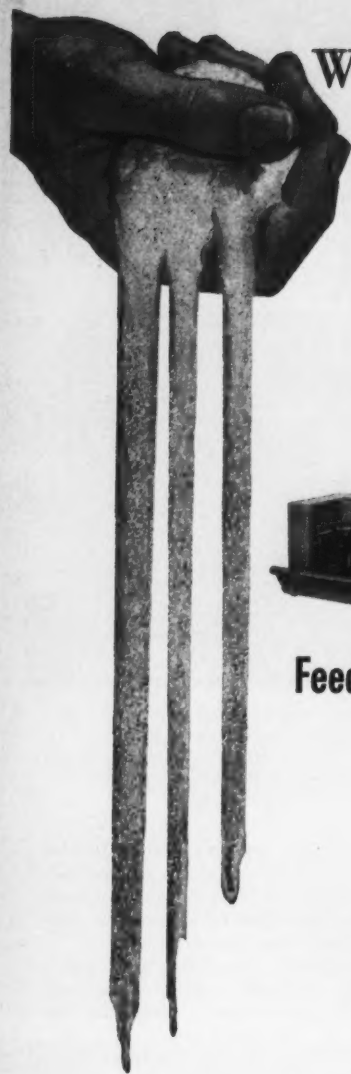
World's Largest Producer of Reinforced Plastic Trays and Tote Boxes

Please send further information on trays for chemical processing. Briefly, we use trays (or boxes) to . . .

Approximate size range  
Name \_\_\_\_\_ Title \_\_\_\_\_  
Company \_\_\_\_\_ Address \_\_\_\_\_

Check 1896 opposite last page.

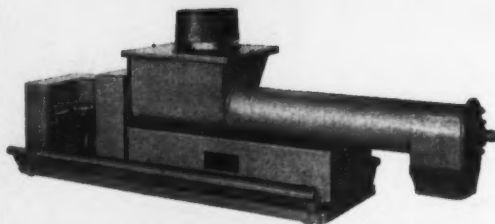




## Which Bulk Feeder?



### Standard Volumetric?



### Feeder-Conveyor Volumetric?



### Gravimetric?

## Exclusive VIBRA SCREW® has ALL THREE

Now the exclusive Vibra Screw principle—combining vibrated screw rotation with vibration of hopper, trough and tube—is now available in a new gravimetric feeder and a heavy duty feeder-conveyor with the same unmatched accuracy for precise feeding of dry materials as the original VIBRA SCREW volumetric feeder.

All three are capable of handling a wide range of different and difficult substances, but each is designed to meet requirements of a specific feeding problem. Consider these facts about each one:

**STANDARD VOLUMETRIC**—For handling all materials, free flowing or sticky, at minute-to-minute accuracy in capacities from ounces to tons per hour.

**FEEDER-CONVEYOR VOLUMETRIC**—For heavy duty service in horizontal conveying as well as feeding from supply pipe or hopper at tonnage rates in screw lengths up to 20 feet.

**GRAVIMETRIC**—For delivering weighed batches directly into process at timed intervals in quantities down to one ounce and frequencies variable up to 4 per minute. These intermittent charges can be converted into a self-adjusting, continuous weight-controlled stream, by using a third screw which continuously rotates and vibrates.

Want more information? Write today for literature. Or better still, send us details of your dry materials handling problem.

See us at the Chem Show, New York Coliseum, Fourth Floor

**VIBRA SCREW FEEDERS, INC.**

156 Huron Avenue, Clifton, New Jersey

Check 1897 opposite last page.

## PROCESSING EQUIPMENT

housing is mounted on 21' high supports.

Due to normal relative humidity of air being handled, moisture condensation in filter bags was not a design problem. Filter has net cloth-filtering area of 2244 sq ft. Capacity is 5800 cfm. Flat filter bags each contain 22 sq ft of filter cloth which is cotton sateen with 104 x 68 thread count.

Exhaust fan keeps filter under negative pressure. This causes air from dust source to flow through bag and also draws in air from outside atmosphere to clean bags.

Cleaning air comes through flexible hose to traveler which moves back and forth across open ends of filter bags, thus causing bags to be cleaned one at a time. Cleaning air is then picked up at main air stream and filtered through active bags.

Earlier models, due to flat-face traveler, necessitated provision of false wall in clean-

air chamber. Instead of flat-face traveler, present model has resilient rubber rolls. This eliminates false wall and makes bag changing easier.

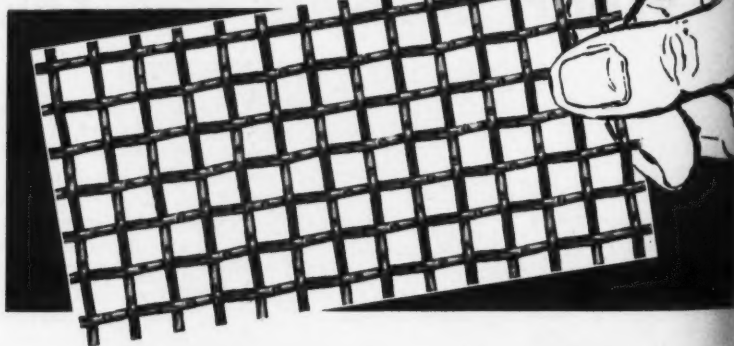
Rolls are soft enough to roll over dust wall and to form complete seal of the two filter bags on either side of bag being cleaned. Roll consists of highly resistant gum rubber, combined with inner filling of sponge rubber around a light, rigid aluminum core. Ends of core contain ball bearings.

Gear head-motor chain-drive moves rolls across dust wall at rate of 3 fpm. Eight-wheel suspension of roller-cleaner carriage provides more wheel area.

**Results:** System has improved dust conditions in work area around machine. Good visibility exists across entire machine floor. Filter discharges haze-free stream of air.

Maintenance and other upkeep have been negligible

## An INTELLIGENT ENGINEERING APPROACH to your wire cloth requirements



● An intelligent engineering approach to wire cloth and screen requirements pays dividends. Cleveland Wire Cloth, knowing alloy, tolerances, openings, crimping and tightness of weave, study the materials being processed, processing conditions and the end results before specifying any wire cloth. They may select from hundreds of unsurpassed quality cloth in stock, or if necessary, will weave a screen for your needs.

Contact Cleveland today for an intelligent engineering approach to your wire cloth and fabricated screen problems. Ask for Bulletin No. 10.

SEE OUR AD IN CEC

THE CLEVELAND WIRE CLOTH & MFG. CO.  
2877 EAST 7th STREET, CLEVELAND 8, OHIO • DI 1-1632

Check 1898 opposite last page.



## PROCESSING EQUIPMENT

since system went into continuous operation on October 30, 1958. Flanged joints permit easy disassembly of pipe. Single bag changing is accomplished by removal of four nuts on front wall and spring at back. Adjacent bags are removed by taking off two nuts.

(6-A Sly "Roll-Clean" Dynaclone dust filter is a product of The W. W. Sly Manufacturing Co., 4735 Train Ave., Cleveland 1, Ohio.)

Check 1899 opposite last page.

Drawing sets and equipment, instruments and materials, designing aids and measuring devices are summarized in a catalog, which incorporates many reference charts, such as decimal equivalents. Cat and Ready Reference Chart—Alvin & Company, Inc., 611 Palisado Ave., Windsor, Connecticut.

Check 1900 opposite last page.

### Ball mill and reactor functions combined in one unit

Permits grinding under carefully controlled conditions

Uses: Grinding various materials under carefully controlled temperature and pressure conditions.

Features: Machine combines functions of a ball mill with a reactor. Access lines permit adding liquids, slurries, or gases while mill is in operation. Vapors may be removed if solids are being dried.

Description: Machine permits multiple operations to be performed in single processing unit. Available in sizes from five to 500 gal working capacity, device will mix materials uniformly while they are being reacted.

Internal pressures may be controlled between full vacuum and 50 psi. Heat transfer



**NO SURFACE IS STRONG ENOUGH**  
to resist the ABRASIVE power of  
**BLACK BEAUTY BLAST GRIT**

Up to 400 lb. working samples free in many grades. Specify need.

**FREE**  
SAMPLE KIT

**BLACK BEAUTY BLAST GRIT**

This is an opportunity to sample several different grades of the most unusual material for blasting. Black Beauty blasting grit completely erases the toughest finish fast, on any type of surface, more economically. Gives you any degree of etch desired for a perfect refinishing surface. See the results you get from this amazing product.

For your FREE attractive sample kit write Dept. No. D

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**H. B. REED CORP.**

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Check 1901 opposite last page.

NOVEMBER 1959



offers important advances in the exacting operation of

# GRANULATION

Sturdy, maintenance-free Rietz construction provides better product control, increased output, and consequent operating economies

## WET GRANULATION



- Higher capacity than conventional screen granulators.

- Produces denser granulation.

- Increases completeness and uniformity of final mix.

- Adapts to batch or continuous operation.

- Controls granule size through interchangeable orifice plates.

- Swings open for easy, thorough, complete cleaning.

## RIETZ EXTRUDERS

Available in a wide range of capacities in stainless or carbon steel.

## DRY GRANULATION



- Variable speed operation assures maximum uniformity of granulation... increases drying oven efficiency.

- Special 360° scuff screen prevents generation of fines from centrifugal attrition... reduces temperature rise.

## RIETZ DISINTEGRATORS

RP Model illustrated is direct connected. Belt driven RA models and direct or belt driven RD models are also available in many sizes and in stainless or carbon steel.

- Easily changed screens and variable speed drive permit quick adaptation to operation as high speed blender of dry ingredients.



Equipment for the Process Industries  
Size Reduction • Mixing • Heat Exchange

**MANUFACTURING COMPANY**

Santa Rosa, California • West Chester, Pennsylvania  
Sales and Engineering Offices in Principal Cities

Check 1902 opposite last page.

If your product is in this list

new **MOREHOUSE**

# super

series **MILLS**

WILL MULTIPLY YOUR PRODUCTION  
IN LESS SPACE, AT LESS COST.

There is a model for every need—from  
laboratory testing to big volume production

IT'S THE ADVANCED  
ENGINEERING  
THAT MAKES THE  
BIG DIFFERENCE  
IN:

GRINDING  
DISPERSING  
MIXING  
EMULSIFYING  
HOMOGENIZING  
DISINTEGRATING

Let us prove it  
in your plant  
at our risk!

Write today for  
complete information



**FOOD** and kindred products including  
meat, dairy, fruit, vegetable, fish,  
bakery, confectionery, cooking fats,  
extracts, food preparations, etc.

**TOBACCO** end-products.

**TEXTILE** dyes, finishes and coatings.

**LUMBER & WOOD** coatings.

**PAPER** coatings and glazes.

**PRINTING** inks.

**CHEMICALS** and kindred products  
including organic and inorganic  
chemicals, drugs, medicines,  
pharmaceuticals, cosmetics, cleaning  
and polishing preparations, waxes,  
fertilizers and insecticides, etc.

**PAINTS, VARNISHES, LACQUERS,**  
**ENAMELS** and similar coatings.

**PETROLEUM** products including greases,  
oils, roofing materials, fuels, etc.

**LEATHER** dyes, special polishes, etc.

**STONE, CLAY** and **GLASS** Products.

**CERAMIC** slips, body materials  
and glazes.

**METAL** core washes, mold coatings and  
special protective coatings.

**MISCELLANEOUS** including pencils,  
crayons, carbon paper coatings, cork  
products, matches, etc.

**RESEARCH LABORATORIES** and  
similar services.



**MOREHOUSE-COWLES, INC.**  
1150 San Fernando Road  
Los Angeles 65, California

Representatives in principal cities  
Convenient lease and time payment plans

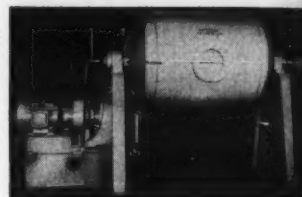
0920

Check 1903 opposite last page.

## PROCESSING EQUIPMENT

jacket can be used for either  
heating or cooling, withstands  
pressures up to 125 psi.

Processes in which the  
equipment may be utilized in-  
clude: 1) Reaction between  
solids and gas; 2) Handling of  
solids as slurries, drying, re-  
acting with gas, then re-  
slurrying; 3) Fine wet grind-  
ing of solids and removing as



Unit will mix or grind materials  
uniformly while they are being  
reacted

fine slurry of product; 4)  
Addition of solids as slurry,  
drying, reducing size, re-  
slurrying and removing slurry  
(in this process air is excluded  
at all times by sealing with  
inert gas); and 5) Reaction  
and size reduction of two  
solids with or without removal  
of gaseous by-product.

(Mil-reactor is development  
of The Patterson Foundry and  
Machine Company, Division of  
Ferro Corporation, East  
Liverpool, Ohio.)

Check 1904 opposite last page.

### Big 15" diameter tubes whip dust collector plugging problem

Tapered outlets assure peak  
efficiency, low maintenance

**Uses:** Although specifically  
designed for use in main kiln  
or clinker cooler cement plant  
installations, collector is also  
recommended for any applica-  
tion where tube plugging in  
small tube collectors is prob-  
lem.

**Features:** Dust collector  
contains 15" diam vertical  
steel inlet tubes. Bottom end  
of each tube is precision taper-  
ed to provide optimum collec-  
tion efficiency, stop rein-  
trainment and minimize plug-  
ging.

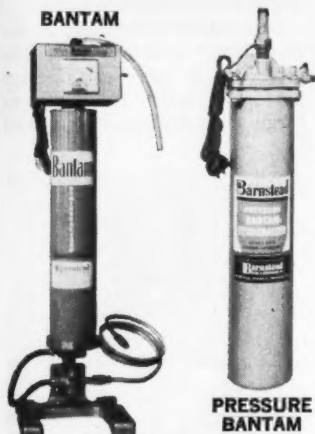
**Description:** Collection effi-  
ciency is compatible with nor-

## BARNSTEAD

### BANTAM DEMINERALIZER

**DOES 5 WATER  
PURIFICATION JOBS  
EMPLOYS 5  
INTERCHANGEABLE  
CARTRIDGES**

BANTAM



PRESSURE  
BANTAM

**STANDARD CARTRIDGE** Produces ion free water at minimum cost... removes 1500 grains as NaCl (1300 as  $\text{CaCO}_3$ ).

**MIXED RESIN CARTRIDGE** For operations demanding better than 1,000,000 ohms resistance and neutral pH. Cartridge capacity is 1230 grains as NaCl (1050 as  $\text{CaCO}_3$ ). Approximately  $\frac{3}{4}$  of cartridge capacity is million ohm water or better.

**ORGANIC REMOVAL CARTRIDGE** Removes organics, organic liquids and gases that would pass through a demineralizer. Effective in removing chlorine. Ideal for pre-treating demineralizer feedwater, for self-purifying high purity rinse systems and other processes where organics or odors in the water are objectionable.

**OXYGEN REMOVAL CARTRIDGE** Developed for cooling water loops where it is important to maintain low oxygen content to prevent corrosion. Cartridge removes one part per million of dissolved oxygen from 2500 gallons of water, or 6.8 liters (9.7 grains) of oxygen at standard temperature and pressure.

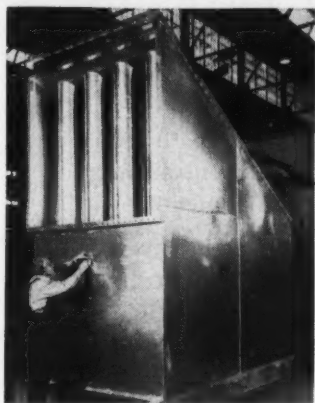
**CATION CARTRIDGE** Provides (1) precious metals recovery, (2) radio-active isotope recovery, at low cost, (3) also useful for removing volatile amines where heating plant steam condensate is being used as the feedwater for a Still, and (4) where close control over the pH of water is necessary, the cation cartridge in its ammonia or lithium form is effective.

Write for Literature  
**Barnstead**  
STILL AND STERILIZER CO.  
66 LANESVILLE TERRACE BOSTON 31, MASS.

## PROCESSING EQUIPMENT

mal primary collector requirements where secondary electrostatic precipitator or silicone glass bag is to be used.

Collector is factory-assembled and has all-welded construction. A sectionalized or modular construction is used.



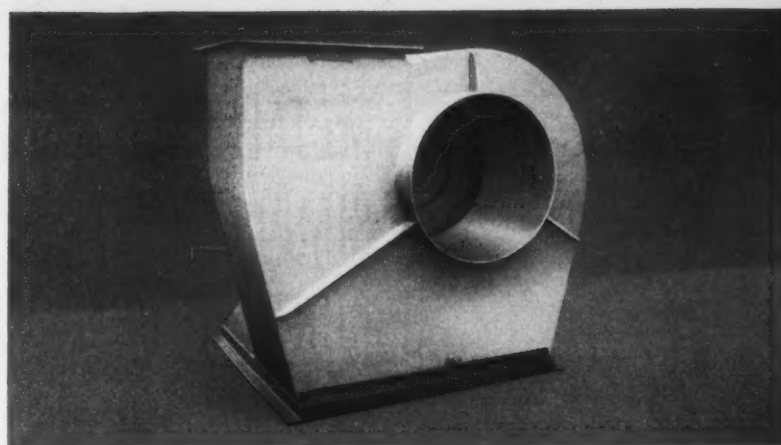
Dust collector's tubes have large openings and smooth wall surfaces for free passage of dust-laden gas or air

Each unit is built up as combination of collector sections to meet a specific dust collection requirement.

Heavy-gage tubes have large openings and smooth wall surfaces. This assures free passage of dust-laden gas or air, regardless of dust analysis.

(Series-345 dust collector is product of American-Standard Industrial Division, American Radiator & Standard Sanitary Corp., Detroit 32, Mich.)

Check 1906 opposite last page.



Heil Large Capacity Rigidon® (Reinforced Plastic) Centrifugal Fan that Exhausts 25,000 CFM of Mixed Acid Fumes at Large Eastern Manufacturing Plant.

For

- Complete Corrosion Resistance
- No Repairs or Maintenance
- Service Proved Design
- Wide Range of Standard Sizes

Specify



## SOLID PLASTIC FANS

... NOTHING TO RUST ...

• Extremely wide range of standard sizes in both centrifugal and axial designs, fabricated of our proven, corrosion resistant **Rigidon®** (reinforced plastic) and **Rigivin®** (rigid vinyl) construction, speeds delivery and minimizes engineering costs.

Let the Heil corrosion engineers, with their wide experience, help you select the size and type of plastic fan that will give you the best service under your particular conditions.

Ask us about Heil solid plastic Collecting Hoods, Ducts, Stacks, and Fume Scrubbers for a completely corrosion resistant, rust-free, ventilating system, also Heil heavy duty rubber lined or coated fans, available in a complete range of capacities and static pressures.

Write for the Heil bulletins. They list standard sizes and give complete specifications.

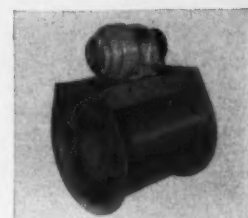


## HEIL PROCESS EQUIPMENT

CORPORATION

12906 Elmwood Ave. • Cleveland 11, Ohio

Check 1907 opposite last page.



Heil Rigivin® (Rigid Vinyl) Axial Fan to Exhaust Fumes from Chemical Laboratory.



Heil Rigidon® (Reinforced Plastic) Centrifugal Fan Handling  $\text{H}_2\text{SO}_4$  Fumes.



Heil 30,000 CFM Heavy Duty Rubber Lined Fan Handling Fumes at Large Chemical Plant.

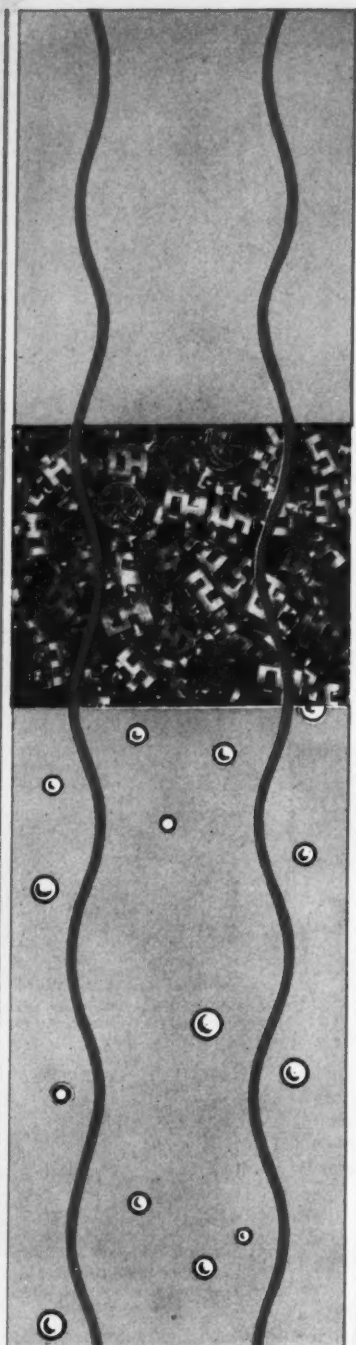


Check 1905 opposite last page.

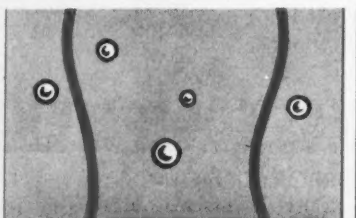
NOVEMBER 1959

159





See us at Booth 111, 27th Exposition of Chemical Industries, New York Coliseum, Nov. 30 thru Dec. 4.



## METAL PALL RINGS OFFER SIMPLE, EFFECTIVE AND SUSTAINED CONTROL OF LIQUID ENTRAINMENT

One of the least expensive, yet one of the most effective ways to minimize liquid entrainment is through the use of metal Pall Rings.\*

A dumped section of Pall Rings one or two sizes smaller than the rings in the bed will effectively capture the entrained liquid with negligible effect on the pressure drop within the tower. Often a section no deeper than 6" will be adequate. Some commercial tray scrubbers employ but a few inches of packing to prevent carry-over.

The unique shape of the Pall Ring, with its wall sections stamped and bent inward, offers these important advantages as a mist eliminator:

1. Lowest pressure drop
2. Freedom from fouling and plugging
3. More impingements per unit time
4. Maintained free space (95% or better)
5. High working velocities without re-entrainment
6. Easy installation

Metal Pall Rings are available in  $\frac{5}{8}$ ", 1",  $1\frac{1}{2}$ " and 2" sizes in carbon steel, stainless steel, nickel, monel, inconel, titanium, copper and aluminum.

  
**U. S. STONWARE**  
AKRON 9, OHIO

\* Are you on our mailing list to receive new technical releases from our experimental laboratories on packed tower performance? If not, drop us a note on your letterhead. No cost. No obligation. Address Dept. CP1159, The U. S. Stoneware Co., Akron 9, Ohio.

\*Pfannmiller, W., TRANS. INST'N. CHEM. ENGRS., Vol. 32, 1954, Supplement, pp.151 ff.  
Eckert, J. S., et al., CHEMICAL ENGINEERING PROCESS, Jan. 1958, pp. 70 ff.

Check 1908 opposite last page.

## PROCESSING EQUIPMENT

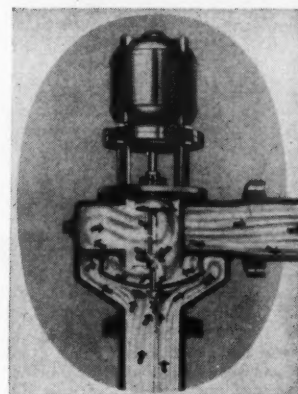
### Pipeline mixers for pilot plants available

Bypass need for intermediate storage, mixing tanks

**Uses:** Performing mixing, blending, and similar operations continuously in pilot plant pipelines.

**Features:** Unit bypasses need for intermediate storage and mixing tanks and simplifies piping layouts.

**Description:** Continuous inline mixer provides fast, uninterrupted service. Device performs same functions as large production-size units



Pipeline mixer is designed for pilot plant use

on the market. Mixer is available in  $\frac{1}{2}$ " and 1" pipe diam size. Variable speed input is recommended where processing changes are anticipated.

(Netco Flomix continuous inline pilot plant mixer is product of Netco Corporation, 81 Tileston St., Everett 49, Mass.)

Check 1909 opposite last page.

### Abrasives handled easily in tungsten carbide-lined fluid energy mill

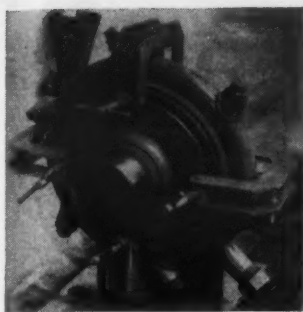
Uses compressed air or steam, has no moving parts

**Uses:** Fine grinding of severely abrasive materials up to hardness of tungsten carbide.

**Features:** Tungsten carbide-lined mill has no moving parts. Pulverization is

11-G

## PROCESSING EQUIPMENT



Mill has no moving parts, reduces tough abrasives to small micron size

achieved by high speed rotation of particles produced by opposing tangential jets of compressed air or steam, which causes violent interaction of particles.

**Description:** Fluid energy mill reduces abrasive materials down to small micron size without attritional heat and without damage to grinding unit or contamination of the feed. Mills are available in three sizes ranging from four to 15" diameter. Capacities depend upon material being processed and degree of fineness desired.

(Further information about Micronizer tungsten carbide-lined fluid energy mills may be obtained from Sturtevant Mill Company, Dorchester, Mass.)

Check 1910 opposite last page.

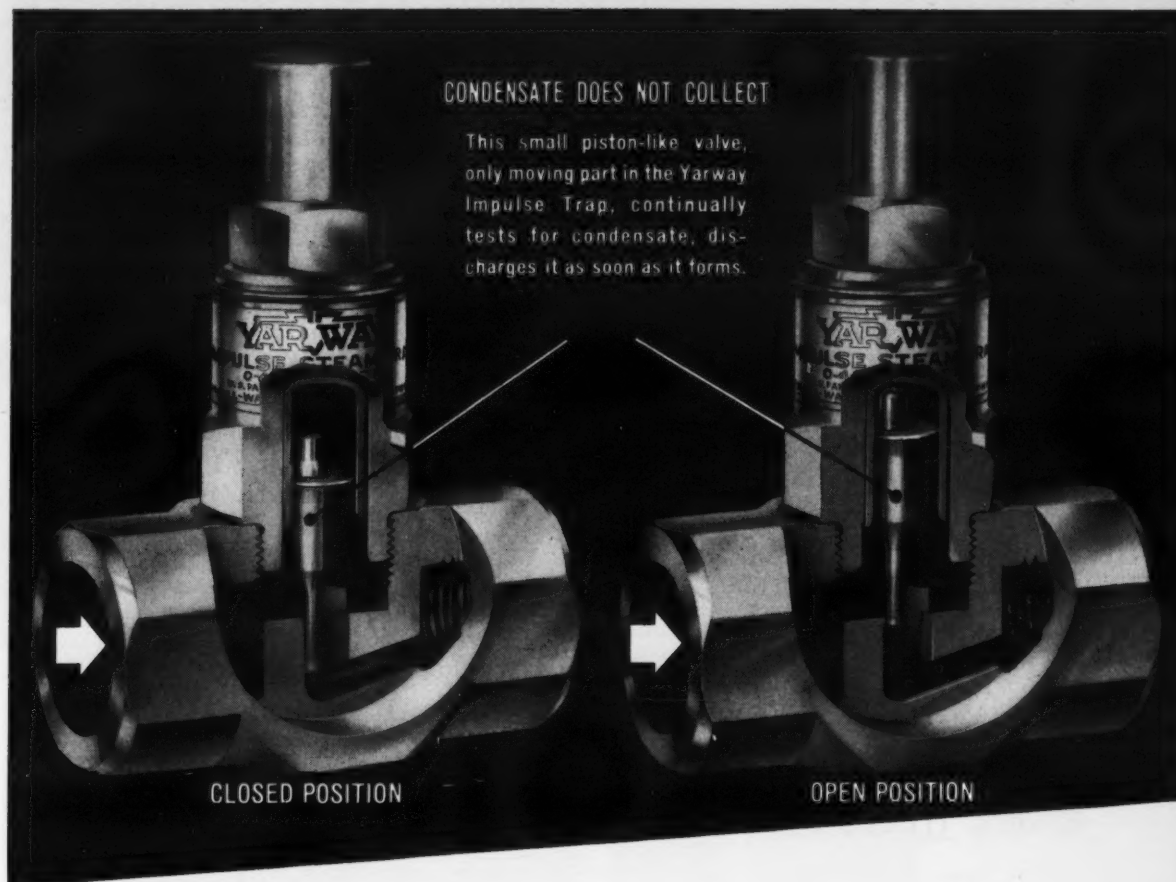
**Processing equipment** manufacturer's new \$1 million plant is described in four-page illustrated folder. Located in Woodlawn, Ohio, a suburb of Cincinnati, facilities will permit firm to expand its fabrication operations. The literature also emphasizes manufacturer's talent for working with various metals and special alloys. "New Plant and Offices"—Vulcan Manufacturing, P.O. Box 22, Cincinnati 15, Ohio.

Check 1911 opposite last page.

**Direct-contact gas scrubbers** for removing particulate matter, including sub-micron dust and fume, and absorption of gases and vapors are subject of eight-page bulletin. Photographs and flow diagrams accompany descriptions of typical applications. Bul 203-C—Peabody Engineering Corporation, 232 Madison Ave., New York 16, New York.

Check 1912 opposite last page.

NOVEMBER 1959



## ***Yarway Impulse puts the heat on steam trap freeze-up problems***

Cold weather means nothing to a Yarway Impulse Steam Trap. *Its design offers full protection against freeze-ups*, with resulting costly production delays and extra maintenance work.

In the Yarway Impulse Trap there's nothing to freeze. No condensate collects. The only moving part (a tiny piston-like valve) continually tests for condensate and discharges it as soon as it forms. Result—continual operation of steam equipment at high, even temperatures.

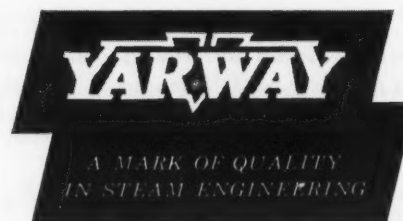
Consider this non-freeze feature with these other Yarway Impulse features:

- Quick heat-up
- Low maintenance
- Stainless steel construction
- Small size—light weight
- Good for all pressures
- Complete line  
for all requirements

—and you have the reasons for nearly 1,300,000 successful installations.

Stocked and sold by 270 Industrial Distributors, coast-to-coast and around the world.

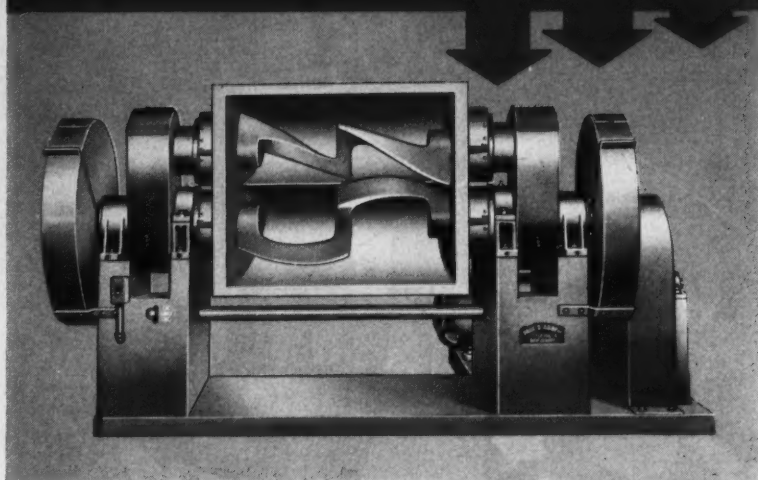
**YARNALL-WARING COMPANY**  
100 Mermaid Ave., Philadelphia 18, Pa.  
BRANCH OFFICES IN PRINCIPAL CITIES



See the Yarway Exhibit at the Chemical Show,  
Booth 49—New York Coliseum, Nov. 30-Dec. 4

Check 1913 opposite last page.

## new mass & paste mixers



**reduce maintenance,  
assure freedom from contamination.**

These new heavy duty mass and paste mixers have many features which sharply reduce maintenance needs. They have double rows of lifetime lubricated bearings. These bearings give long, trouble-free performance without maintenance or lubrication of any kind under the most severe operating conditions. They are extremely low-friction bearings and can be used at elevated temperatures.

All gears are protected from dust and dirt by guards which remain in place whether the bowl is in the horizontal or the dumping position. Doors in the guards simplify lubrication of the gears.

Improved seals, easily accessible for maintenance, assure freedom from contamination.

Made in a range of sizes from 3 to 300 gallons capacity, the mixer illustrated has a mixing volume of 150 gallons.

These improved mixers are available in various materials of construction. Jackets for heating and cooling can be installed around the mixer bowl, if desired. Various styles of mixer blades can be furnished to ensure the most effective mixing and blending of a wide variety of materials.

Write today for additional information.

**PAUL O. ABBÉ INC.**  
GRINDING & MIXING EQUIPMENT  
402 CENTER AVENUE, LITTLE FALLS, NEW JERSEY

PEBBLE MILLS  
STEEL BALL MILLS  
JAW MILLS  
JAW ROLLING MILLS

MASS & PASTE MIXERS  
RIBBON MIXERS  
ROTA-CONE BLENDERS  
ROTA-CONE VACUUM DRYERS

Check 1914 opposite last page.

## PROCESSING EQUIPMENT

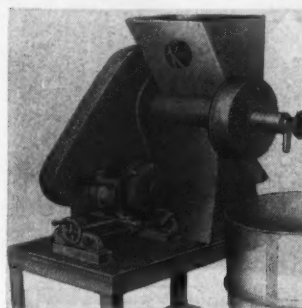
**Only 2-3 minutes needed  
to dismantle, clean  
heavy-duty crusher**

Low cost unit can handle  
wide variety of materials

**Uses:** Pulverizing various  
products in chemical and al-  
lied industries.

**Features:** Machine can be  
dismantled and cleaned in  
two or three minutes. Clear-  
ance of plates and fineness of  
grind are easily adjusted by  
handwheel.

**Description:** Heavy-duty  
unit has revolving crushing  
roll inside hopper to give ma-  
terial preliminary breakdown



Revolving roll inside hopper  
gives product preliminary break-  
ing down before it is fed into  
crusher's main grinding plates

before feeding between hard-  
ened steel grinding plates.  
Variable speed drive is stand-  
ard equipment

Indicating gage insures ac-  
curate fineness control of  
grind.

The crusher has low initial  
cost and is simple to operate.  
Coarse or fine grinding plates  
are interchangeable.

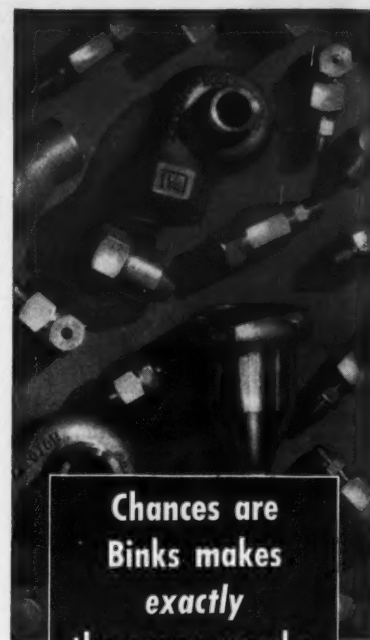
(No. 70-H size 4 crusher is  
product of Charles Ross &  
Son Company, 148-156 Clas-  
son Avenue, Brooklyn 5,  
New York.)

Check 1915 opposite last page.

### Spiral condenser mounts on top of column

**Uses:** Condensing vapors  
from distillation columns or  
other vessels.

**Features:** Condensers may  
be installed as top section of



**Chances are  
Binks makes  
exactly  
the spray nozzles  
you need**

for washing, cooling, processing,  
humidifying, dehydrating and  
hundreds of other applications.

Whatever your production or  
process requirements...you'll  
get the *right* spray nozzles  
quicker by calling Binks.

There is a size and spray pat-  
tern for every purpose...with  
nozzles cast or machined from  
standard or special corrosion-  
resistant metals and materials.

Send for Catalog 5600

Gives details on nozzle  
applications, sizes,  
capacities, spray  
patterns and metals.  
Easy to use selection  
tables.



Binks Manufacturing Company  
3120-32 Carroll Ave.  
Chicago 12, Ill.

Send me your comprehensive Spray Nozzle  
Catalog 5600—no obligation, of course.

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CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_ 7047

**Binks**

A COMPLETE LINE OF  
INDUSTRIAL SPRAY NOZZLES  
AND COOLING TOWERS

MAIL  
COUPON  
NOW

Check 1916 opposite last page.

CHEMICAL PROCESSING



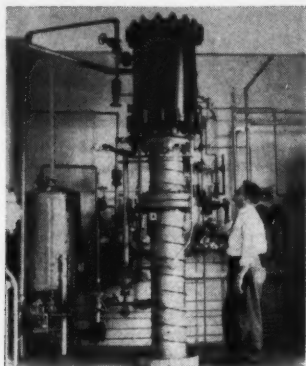
## PROCESSING EQUIPMENT

column. Separate outlets are provided for condensate and noncondensables. Rapid and complete separation of condensate from gases is accomplished, thereby preventing partial reabsorption.

**Description:** Spiral condenser consists of two duct-like spiral passages, arranged to form two continuous passages of rectangular cross-section.

Economy is achieved through elimination of elaborate supporting structures, large diam vapor lines, and other auxiliaries used in conventional designs.

Vapor path can be full counter current spiral flow, combined cross flow-spiral flow, or full cross flow. Any



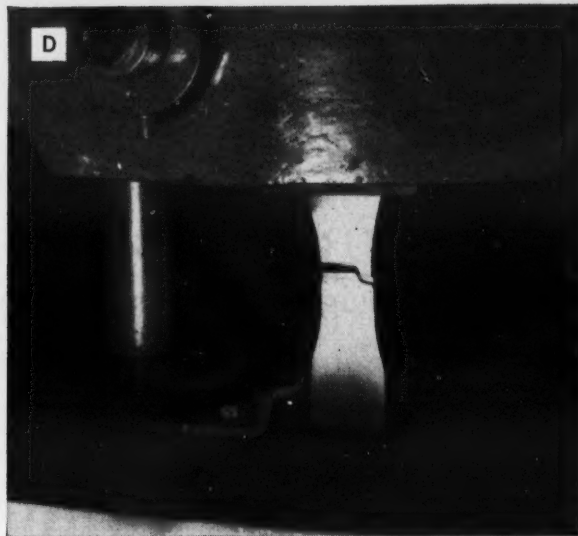
Compact spiral condenser fits on top of column, is available in sizes ranging from 15 to 1600 sq ft

combination for maximum or minimum cooling of condensate and noncondensables can be obtained in the in-built after-cooling zone.

Condensers may be used for either total, partial, reflux, vent or knockdown condensing services. Sizes range from 15 to 1600 sq ft. Design pressures are up to 150 psi. Large volume condensate retention capacity can be incorporated, if desired. Units may be fabricated from any material capable of being cold formed and welded to ASME Code requirements.

(Direct-mount spiral condensers are product of American Heat Reclaiming Corporation, 1270 Sixth Avenue, New York, New York.)

Check 1917 opposite last page.



## Our testing team works for you

Your requirements come first with our testing team. Working directly under our chief engineer, they check and double-check the fabrication work of our production crews. Your own men couldn't do a more faithful job. Come and see for yourself. Or write for Bulletins HE and CI.

**A For a close fit**—Incoming tubes are always miked for exact size. Matching tube sheets are then reamed for a close fit that contributes to heat exchanger quality.

**B Tailored to size**—Quality dictates precise tube hole diameter. Constant micrometer checking tells our inspector that tube sheets are exactly right to meet your specs.

**C In the dark**—but not for long. Our own darkroom permits immediate developing of X-ray films... gives our inspector a fast check of weld structure and soundness.

**D Reply requested**—Our inspectors get many prompt reports from our own testing lab. Here's a tensile test on our own machine. It helps speed testing and inspection.

## Downingtown Iron Works, Inc.

144 Wallace Ave., Downingtown, Pennsylvania

division of **PRESSED STEEL TANK COMPANY** Milwaukee

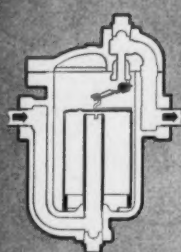
Branch offices in principal cities

**HEAT EXCHANGERS—STEEL AND ALLOY PLATE FABRICATION  
CONTAINERS AND PRESSURE VESSELS FOR GASES, LIQUIDS AND SOLIDS**

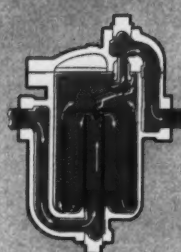


Check 1918 opposite last page.

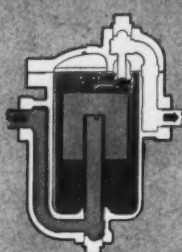
**This simple trap operating principle provides the efficiency, dependability and freedom from maintenance necessary for the most profitable use of steam**



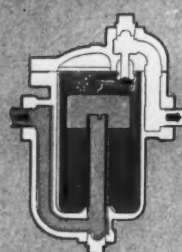
When trap is first installed, the inverted bucket is down and the valve is wide open.



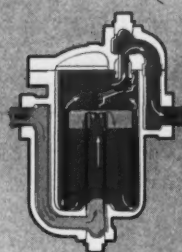
When steam is turned on, condensate (solid color) flows into trap and out through discharge orifice, until —



Steam (light color) reaching the trap floats the inverted bucket and closes the valve.



When more condensate enters the trap, the bucket loses buoyancy and pulls on valve lever.



When weight of bucket times leverage overcomes pressure on valve, bucket sinks and opens trap.

Key: ■ condensate ■ steam ● steam bubbles ● air bubbles

## ARMSTRONG INVERTED BUCKET STEAM TRAPS are designed and made to give you these big benefits:

● **Armstrong Traps**, the first inverted bucket steam traps, now represent the most advanced development of this time-proven principle. They provide all the advantages necessary for efficient, economical condensate drainage from virtually all types of steam using equipment.

1. **No steam loss** — Steam never reaches the orifice even when there is no condensate load.
2. **Automatic air elimination** — Vent in trap bucket passes air and other non-condensibles through to be discharged with condensate.
3. **No cooling leg required** — Condensate is discharged at steam temperature as fast as it reaches the trap because trap operates on difference in density between steam and water not on temperature.
4. **Operates on any back pressure** — Failure of one trap in system will not cause others to open because high back pressure does not affect an Armstrong trap other than to reduce capacity. As long as there is a

pressure differential across the orifice the trap will close on steam and open for condensate.

5. **Unaffected by ordinary dirt** — Swirling action of condensate keeps dirt in suspension until discharged with condensate, prevents it from lodging in valve.
6. **Completely dependable** — Proved design plus the use of all stainless steel working parts assure continuity of service and length of service unmatched by any other trap.
7. **Big capacity in a small, economical package** — Armstrong design gives you the highest practical capacity for any given pressure. And remember, Armstrong capacity ratings are based on *hot* condensate at the *working pressure differential* stated, not on theoretical orifice capacities.

Further information on these advantages plus much additional information is given in the 48 page Armstrong Steam Trap Book. Ask your local Armstrong Representative or write direct.



860 Series for low pressure heating service.



800 Series, side inlet, side outlet.



No. 801, side inlet, bottom outlet.



890 Series, integral strainer.



200 Series, bottom inlet, top outlet.



Forged Steel Series for high pressures, high temperatures.



The 48 page Armstrong Steam Trap Book tells how to correctly size, install and maintain steam traps for any pressure, any temperature, any load plus full catalog data on Armstrong Steam Traps. Ask for Catalog K.



**ARMSTRONG MACHINE WORKS**

8805 Maple Street

Three Rivers, Michigan

"See our catalog in Chemical Engineering Catalog"  
"See our exhibit — Booth 1226 at the Chemical Show"

Check 1919 opposite last page.

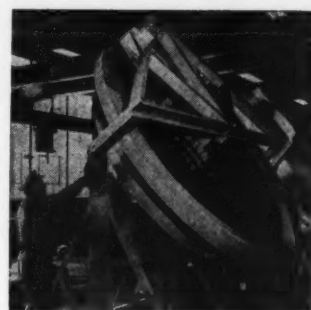
## PROCESSING EQUIPMENT

**Discs agglomerate, mix wide variety of fines**

Afford means of reclaiming waste materials

Uses: Continuous agglomeration and mixing of wide variety of fine solids.

Features: Discs are equally effective for either pelletizing or mixing. Fine products can be pelletized to any size rang-



Disc's rolling action pelletizes fine material and automatically classifies the pellets

ing from 1/16 to 1½ inch. Processing time is less than with conventional batch or continuous mixers.

**Description:** Discs are available in four basic sizes—3¼, 8½, 12, and 16½ foot diam. Smallest size is also available for pilot plant rental use.

Fines are fed onto disc and water or waste liquors sprayed on them. Disc's rolling action pelletizes the fine material and automatically classifies pellets. Larger pellets roll toward disc rim while smaller ones stay near center or under the large ones. Only larger pellets are discharged over rim when disc is filled.

Rotation of disc produces tumbling, cascading action in materials being processed. Resultant mingling of dry or appropriately moist granular materials approximates action of conventional batch mixing and blending equipment. Disc provides continuous mixing, permitting uninterrupted flow of process materials. Mixing may be done with or without agglomeration of materials in process.

When used for mixing, discs are run at substantially higher

CHEMICAL PROCESSING

## PROCESSING EQUIPMENT

speeds and thus can handle large volumes of product in relatively short times. Retention time is controlled by changing speed of rotation and angle.

Materials successfully pelletized to date on discs include common salt, molybdenum trioxide, ammonium sulfate, zinc oxide, aluminum oxide, phosphate rock fines, and cement rock.

(Pelletizing-mixing discs are product of Dravo Corporation, Neville Island, Pittsburgh 25, Pennsylvania.)

Check 1920 opposite last page.

**Mulling principle** of blending and dispersing dry, semi-liquid, or pasty solid materials is topic of 12-page bulletin. Specifications, capacity data, and applications of machines are listed. "Mix-Mullers"—Simpson Mix-Muller Division, National Engineering Company, Machinery Hall, Chicago 6, Ill.

Check 1921 opposite last page.



### Duplicate controls . . .

. . . installed on both sides of this 50-cu ft conical-shaped rotating vacuum dryer provide for convenient operation. Controls actuate air-operated dust stop bellows and gate valve of dryer's loading and unloading port (shown at top in picture) and permit charging and discharging operations to be controlled from a single floor position.

(Stokes conical rotating vacuum dryers are product of F. J. Stokes Corp., 5500 Tabor Road, Philadelphia 20, Pennsylvania.)

Check 1922 opposite last pg.



## NEW EVAPORATOR SPEEDS GELATIN PRODUCTION

Gelatin, like other heat sensitive food products must be processed quickly if a pure, high-quality product is to be obtained. The double-effect, long-tube, vertical Swenson evaporator shown above was specially engineered for minimum product retention. A 3 per cent gelatin solution is processed at the high rate of 11,500 lbs. per hour, yielding a top-grade 20 per cent solution required for drying. A thorough understanding of the problem, careful planning and engineering, and the finest construction produced this efficient, stainless unit, adaptable to the processing of many food products. Its quality is typical of all Swenson equipment for the food, chemical, and petroleum industries. Whatever your needs in evaporators, spray dryers, crystallizers, or special equipment, call on your Swenson engineer.

**WRITE** for more information on Swenson evaporators. Ask for Bulletin E-100.  
Swenson Evaporator Company, 15667 Lathrop Avenue, Harvey, Illinois



PROVED ENGINEERING FOR THE PROCESS INDUSTRIES SINCE 1889

# SWENSON



WHITING—MANUFACTURERS OF CRANES; TRAMBEAM HANDLING SYSTEMS; TRACKMOBILES; FOUNDRY AND RAILROAD EQUIPMENT

Check 1923 opposite last page.

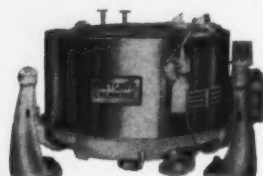


# Only **FLETCHER** makes a **CENTRIFUGAL** for every purpose



Bottom Discharge →

**TORNADO**  
40" to 48" basket,  
6.4 to 16 cu. ft.



**CHEMWIND**  
30" to 60" basket,  
2.8 to 12½ cu. ft.

**HURRICANE**  
20" to 36" basket,  
.9 to 10 cu. ft.



**CYCLONE**  
17" to 30" basket,  
1.2 to 5.3 cu. ft.

**SUSPENDED**  
20" to 48" basket,  
1 to 16 cu. ft.



**LABORATORY MODELS** for Pilot, .20 cu. ft. Rugged, compact machine combines functions of extractor, separator and clarifier. Results from this test unit can be accurately scaled up to production unit.

All Fletcher centrifugals can be made of carbon or stainless steel—and can be lined with lead, rubber or any acid-resisting material.

See Fletcher Centrifugals In Operation  
At The Chemical Exposition—Booth 459

ASK ABOUT THE FLETCHER RENTAL PLAN

## The Fletcher Division OF THE SHARPLES CORPORATION

2300 Westmoreland Street • Philadelphia 40, Pa.

Send me additional information on the following Fletcher Centrifugals:

☐ Tornado ☐ Suspended ☐ Chemwind ☐ Hurricane ☐ Cyclone ☐ Pilot Model

NAME & TITLE \_\_\_\_\_

ADDRESS \_\_\_\_\_

COMPANY \_\_\_\_\_

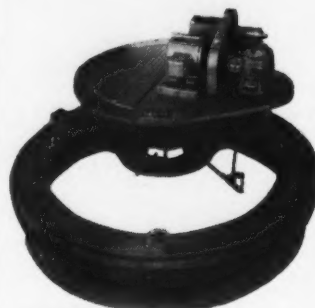
CITY & STATE \_\_\_\_\_

Check 1924 opposite last page.

## PROCESSING EQUIPMENT

Quiet operation featured  
on heavy-duty drive  
for clarifiers

Heavy-duty, horizontal, spur-gear drive has been developed by manufacturer for use on his line of clarifiers and thickeners. The drive head has a completely enclosed, integral gearing arrangement.



Horizontal, spur-gear drive has completely enclosed integral gear arrangement

Functioning in an oil bath, gears are of Mechanite cast iron, as is the housing. Anti-friction ball and roller-tapered bearings are used throughout. Pinions are of forged steel.

Designated as the model C, the drive features smooth-running quiet operation with little wear. Only maintenance required consists of an infrequent oil change and regreasing about once every five years.

(Further information about Model C spur-gear drive may be obtained from Graver Water Conditioning Co., Division of Union Tank Car Company, 216 West 14th St., New York 11, New York.)

Check 1925 opposite last page.

**Processing time reduced through use of improved high-speed disperser**

Uses: Mixing, dispersing, or emulsifying liquids, pastes, or similar materials.

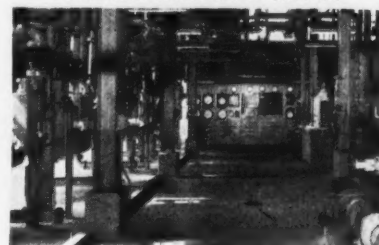
Features: Multiple-action impeller on unit reportedly can reduce processing time by as much as 50% over that required by conventional machines. Millhead speeds can be

**NOW** "ON ORDER"

**ILLCO-WAY**

**ionXchange**  
EQUIPMENT

CORN SYRUP DE-IONIZER USED SINCE 1948



IWT has long been known for successfully applying ionXchange to processes other than water treatment, including such familiar ones as recovery of chromic acid, purification of glycerine to a very high degree, removal of iron from hydrochloric acid, and purification of such organic chemicals as formaldehyde, methanol, and ethylene glycol.

**TYPICAL IONXCHANGERS FROM CURRENT ORDERS INCLUDE THE FOLLOWING**

**MILK** A condensed milk plant in Iowa will use ionXchange to reduce calcium content and produce a "soft-curd" milk.

**WINE** An upstate New York wine producer has ordered ionXchange equipment of polished stainless steel for stabilization ("cold-proofing") of wine.

**GLYCERINE** The first full-scale commercial ION EXCLUSION system for de-salting glycerine will be installed in a western chemical plant. A mid-western glycerine producer will install ionXchange equipment to recover USP glycerine from a waste stream, without distillation.

**GRAPE JUICE** An eastern food processor has ordered equipment to remove excess potassium from grape juice.

**CITRIC ACID** An eastern producer will remove heavy metals and alkaline earth metals from citric acid by cation exchange.

**OTHERS ARE "IN PROCESS"**

We are also building pilot plant equipment and fulfilling research contracts covering a number of other previously untried ionXchange processes, for visitors who have come to us from all over the free world to discuss possibilities of using ionXchange.

**ILLINOIS WATER TREATMENT CO.**  
840 CEDAR ST., ROCKFORD, ILLINOIS  
NEW YORK OFFICE: 141 E. 44th St., New York 17, N.Y.  
CANADIAN DIST.: Pumps & Sulfonators, Ltd., London, Ont.

Check 1926 opposite last page.

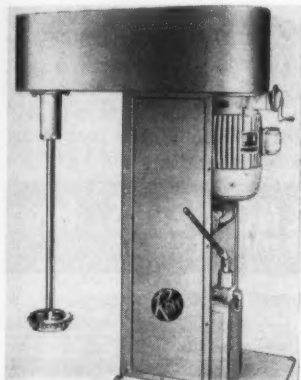
CHEMICAL PROCESSING

## PROCESSING EQUIPMENT

varied anywhere between 2059 and 10,323 fpm.

**Description:** Disperser is of an improved design and can be used in any size tanks or containers ranging from 55-gal drums up to 40" diam by 45" deep tank. Millhead and shaft are made of stainless steel. Millhead is easily raised out of mixing chamber by hydraulic jacking unit.

In operation, product being processed is drawn down into millhead by pitched impeller vanes and thrown at high speed against baffles. Abrasive action occurs as material is



High-speed disperser is available in variety of sizes, ranging from laboratory to large production models

pumped through narrow orifice with spaced disperser bars.

Teeth located around outer periphery of millhead subject material to shearing action. Hydraulic shear is also achieved when product is jetted out in thin streams at high speeds through slower moving surrounding material.

(High-speed dispersers are product of Charles Ross & Son Company, 148-156 Classon Ave., Brooklyn 5, N.Y.)

Check 1927 opposite last page.

**Finned heat exchangers** for air and gases are topic of four-page bulletin. Described and illustrated are continuous, spiral-wound fins which are crimped to provide extra surface and to promote turbulence. Bul 11R—Schutte and Koerting Company, Cornwells Heights, Bucks County, Pa.

Check 1928 opposite last page.

# SEE



## THE SPARKLER AUTOMATIC·SELF CLEANING FILTER

**At the 27th Exposition of Chemical Industries  
New York • Nov. 30–Dec. 4**

# BOOTH-56



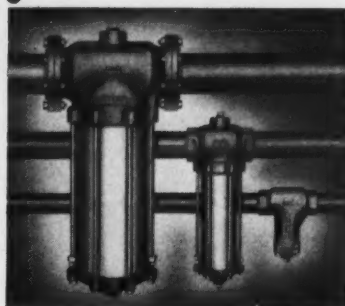
**SPARKLER MANUFACTURING CO.  
MUNDELEIN, ILLINOIS U. S. A.**

Sparkler International Ltd., Manufacturing Plants at Leliegracht 9,  
Amsterdam, Holland; Toronto, Ontario, Canada; Italy and Australia.

**FILTRATION ENGINEERING AND MANUFACTURING EXCLUSIVELY FOR OVER 35 YEARS.**

Check 1929 opposite last page.

## LINE STRAINERS



for  
**SPRAY  
NOZZLE  
SYSTEMS**  
and  
**RELATED  
APPLICATIONS**

in stainless steel, cast iron and brass

A complete range of capacities in 1/4" to 4" female pipe connection sizes... and in 3" to 6" flange connection sizes. Keeps lines clear for efficient operation. Easily flushed.

**TOP PERFORMANCE DESIGN**  
Screen area so large that strainers will take 75% blocking with less than 1/2 lb. pressure drop under normal flow conditions. Top and bottom flange collars on screen give seal fit and rigidity.

**SPRAYING SYSTEMS CO.**

3216 Randolph Street  
Bellwood, Illinois



WRITE FOR your free  
copy of BULLETIN 94  
... gives complete  
information

Check 1930 opposite last page.

**SAVE ON  
FILTER MEDIA  
OF ALL TYPES**

**...with LAMPORTS  
JOB ENGINEERING**

With hundreds of different fibers, constructions and grades of filter media available, it takes a specialist to guide you to the most efficient and economical material for any given job. Lamports engineers are qualified by years of experience in the field to advise you on any filtration problem. Double-check your present media with us, or let us help you plan your next installation. Technical assistance without obligation. Call, write, wire, or TWX.

THE

filter media are the **HEART**

of the filtration system!

See our advertisement in Chem. Eng. Cat.

**Lamports**  
COMPANY

1405 W. Sixth Street • Cleveland 13, Ohio  
Phone: MA 1-3315 Teletype CV-768

Check 1931 opposite last page.

## Patent Licensing

From page 29

depends, in general, much more on exports than does that of an American company.

Thus, much more than their American counterpart, the European chemical industry must weigh to what extent licenses on know-how and patents granted to a foreign company will impair exports. They will, if possible, try to limit the territorial scope of the license and rely in this respect on their patent position. In most cases, the least they can and will do is not to grant licenses on patents in countries to which they do not want the licensee to export.

### How It Works

As an example, the owner may renounce his exclusive selling rights in that country but keep the right to prevent from selling abroad. In this way the licensor does not only prevent his licensees from exporting to other foreign countries in which the licensor holds corresponding patents but also to countries in which he has none.

An important part of the exports of European chemical factories goes to other parts of Europe. As a rule, an European chemical company will be much more reluctant to license another European company than a company operating outside of Europe.

As the European Common Market becomes more effective, this tendency will probably become even stronger. Provided the financial resources permit, a big company, lacking adequate facilities or cheap raw materials and realizing the need for another production center within the Common Market, will prefer to place such a new production unit into a European subsidiary company controlled by it.

It is to be expected that any monopoly formation through excessive concentration of economic power will be prohibited by the stringent antitrust provisions contained in the Treaty of Rome relating to the formation of the European Economic Community. However, these practical implementations will still take some

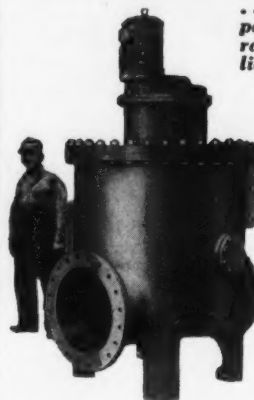
More clean water at a lower cost with...

**S.P. KINNEY**

**AUTOMATIC  
SELF-CLEANING**

## STRAINERS

... for efficient removal and disposal of suspended particles from raw or process water and other liquids



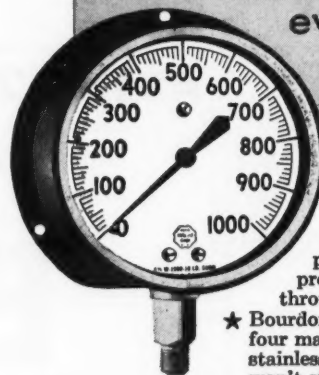
- ✓ Over 1000 installations
- ✓ 2" to 48" pipeline sizes
- ✓ Installation on pressure or suction side of pump
- ✓ Over 8 billion gallons per day installed capacity
- ✓ Large variety of straining media

Write today for Bulletin 500.1  
and list of installations

**S.P. KINNEY ENGINEERS, Inc.**  
CARNEGIE, PENNSYLVANIA

Check 1932 opposite last page.

**Helicoid Gages give  
Sustained Accuracy,  
even on the  
toughest  
jobs**



- ★ Exclusive Helicoid movement has no gears, no teeth. Shock-proof construction protects accuracy through millions of cycles.
- ★ Bourdon tubes available in four materials—bronze, steel, stainless steel, and K Monel—won't stretch, crack, or leak.
- ★ Six cases, including new solid-front safety case, meet every mounting requirement.
- ★ External pointer adjustment can't be jarred out of position.
- ★ A complete selection of gages and accessories for hydraulic, chemical, and other service.

Write for Catalog DH-65.

**HELICOID GAGES**

Helicoid Gage Division  
American Chain & Cable Company, Inc.  
929-P Connecticut Avenue • Bridgeport 2, Conn.



Check 1933 opposite last page.

CHEMICAL PROCESSING



time to be effective.

Licensing of patents is, of course, only possible in countries in which patents covering a monopoly or privilege to the owner to manufacture, use and sell a certain commodity are granted. This is not the case in countries under the Communist regime.

When a European company by licensing its patent to a competitor in a foreign country partly gives up its export monopoly, it may be more interested in the possibility of obtaining similar rights in another field from the licensee than in royalty fees.

A big foreign company is generally preferred because the possibility of obtaining licenses in return is greater than from a correspondingly small company. Contracts providing for an exchange of patent and know-how licenses, whose value compensates for each other, are particularly attractive.

Since costs of filing and prosecuting patents are high, the European chemical industry does not file in all countries to which it exports its products.

In many cases, it will file only in industrialized countries with a view of preventing the resident competing chemical industry from manufacturing the same product and from disturbing its market by exports. Its export interest in the industrialized country itself is, however, often small.

#### Exclusive License Rare

An European chemical manufacturer is, in general, reluctant to grant an exclusive license to a foreign company because it deprives him of export rights. On the other hand, as the individual European markets are relatively small, an European company receiving a foreign license often will insist upon exclusive rights, at least in its own country.

Problems arising in international licensing of chemical technology, often coupled with licensing of patents, are more complex.

In exchange of chemical technology in the Western

## Water Purity

• FOR EVERY NEED •

### American Sterilizer WATER STILLS

- \* ½ to 500 gallons per hour Evaporator capacity range.
- \* Steam, Electric or Gas heated installations . . . Kerosene or Gasoline heated Portable Units.
- \* Fully automatic or manual controls.
- \* Single, Double and Triple distilling systems.
- \* Storage Tank capacities from 5 to 1000 gallons.
- \* All internal parts heavily coated with pure block tin. Stainless steel, Aluminum or special alloys also available.

Thousands of Amsco Water Stills in laboratories, industrial or processing plants and hospitals throughout the world are producing distilled water of the very highest purity . . . economically, dependably and efficiently.

Whether the distillate quantity is small or large . . . for exacting laboratory experiments, or for mass processing . . . the purity of water is the same, exceeding the standard set up by the United States Pharmacopeia.

Whatever your water conditions or distillate requirements there is an Amsco distilling system especially adapted to your needs. Write for detailed information . . . Bulletin IC-601.



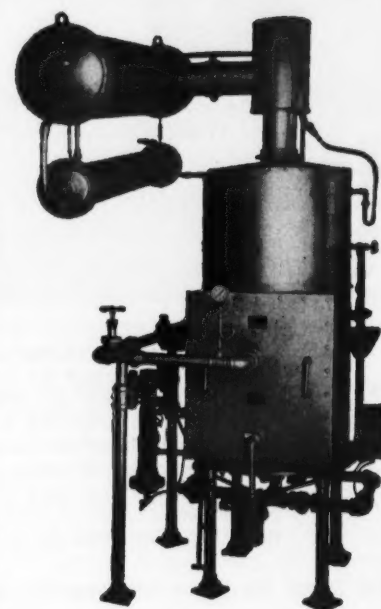
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Typical Laboratory Still:  
Electric heated. ½ to  
10 gallons per hour  
capacity.



Typical Industrial Unit: Mass production  
steam heated Still with automatic con-  
trols. 50 to 500 gallons per hour capacity.

#### Deionizers . . .

5 to 1000 gallons per hour . . . with  
cation or anion resin in single bed  
or dual bed arrangement.

INDUSTRIAL and SCIENTIFIC DIVISION

Check 1934 opposite last page.

# CUSTOM TREATED FILTER CLOTH FOR LONGER LIFE



Every NFM FILTER CLOTH gets a treatment specifically designed to withstand the conditions it will meet on the job. Our cottons are specially impregnated to resist *acids* and *alkalies*. We treat our glass fabrics with silicones and Teflon for *abrasion* resistance. Our cottons and synthetics get the full treatment for *stability*: cold water shrinkage, hot water shrinkage, and heat setting. Nylon gets a dose of neoprene and Hypalon; glass fibres take vinyl shots for their health.

**The longer the life — the lower the cost**

Service life is the true measure of filter cloth economy. By selecting from the many NFM FABRICS the one that is *custom treated* to last longer in *your* filtration process, you save most where the costs are highest: by reducing down-time, change-over labor, and replacement. When the problem is tough, call the doctor for the NFM ECONOMY TREATMENT.

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*Tell us your application, we will send you samples*



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**NATIONAL FILTER MEDIA Corporation**

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Chicago, Ill.: 6034 N. Cicero Ave.

Elizabethton, Tenn.: Paul Chapman Assoc., Box 787

Cincinnati, Ohio: Roselawn Center Bldg.

Houston, Texas: 1607 Jefferson Avenue

Pensacola, Fla.: Chem-Quip Co., 1102 Texar Drive

Check 1935 opposite last page.

## Patent Licensing

*From preceding page*

Hemisphere, Western Europe plays an important role both as a licensor and as a licensee. This exchange is particularly intense between Europe and the United States. The fundamental theory often is found in Europe, but its large-scale technological applications are developed in America.

The general pattern on international license contracts on patents and/or know-how, made between European chemical firms in the Western Hemisphere, is very much like that made between American companies. In each contract, currency regulations valid for licensor and licensee must be taken into account. This is especially important when the licensee is obliged to pay royalties over an extended period of time.

## Currency Has Effects

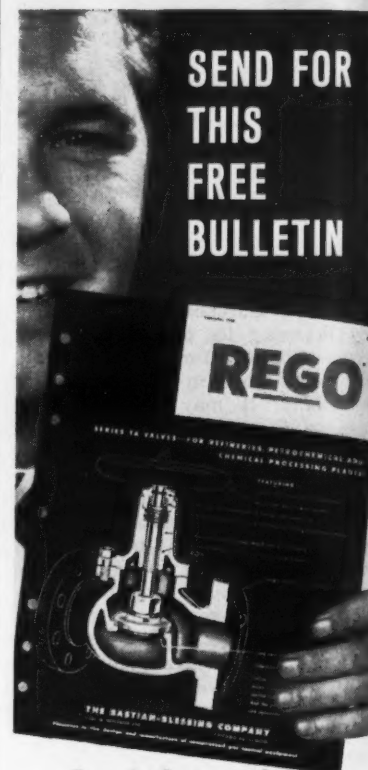
It may well happen that, through a change in the currency regulations in his own country, the licensee will no longer be in a position to transfer payment of royalties. The licensor may then receive currency that must be spent in the licensee's country. In countries with an unstable currency, it is often better to receive a lump sum in hard dollars during the early stages of the contract than to hope for a large royalty income in the future.

The currency aspect becomes still more important when, as it is often the case, not only technology but also equipment is to be supplied.

The question of taxes levied on revenues in the licensee's country is to be investigated in every case. If there is a treaty avoiding double taxation between countries of the two parties, the licensor will only have to pay taxes in one country — either his own or that of the licensee.

If there is no treaty, he may be in the lucky position to be able to deduct taxes in the licensee's country from the taxes he has to pay in his own country.

If the licensor has to pay a tax on his license income abroad as well as in his own country, licensing loses much



**for information  
on improved  
valve performance**

Features application and specification details for outstanding TA Series Globe and Angle Valves. Permanently leakproof — no packing to adjust or cause binding of stems: have exclusive Teflon V-Ring Pressure Seal, providing positive leakproof stem seal; Teflon Seat Disc for long life. Rugged Ductile Iron body. Bulletin lists over 100 different fluids that can be controlled by TA Series Valves.

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- ☐ TA Series Globe and Angle Valves
- ☐ Relief Valve Manifolds
- ☐ Liquid Oxygen Relief Valves
- ☐ High Pressure Gas Regulators
- ☐ High Pressure Cylinder Manifolds

Check 1936 opposite last page.

CHEMICAL PROCESSING

of its attractiveness.

If the license contract provides for royalty payments running for considerable time, there also is the risk the government of the licensee's country may increase the tax rate due on income of foreigners.

And if this government has to watch closely its balance of payments, it may not honor a clause in the contract providing for payment of income taxes by the licensee.

While the principles, formulas, and equations of chemistry are universal, the way in which chemical technology is applied differs in various countries, and American companies also encounter many problems of the European chemical industry in their license agreements.

Differences in the raw material situation, differences in wages and social obligations, and differences as to the level of the machine industry lead to different approaches in solving one and the same technical problem.

## Chem Show Preview

From page 32

**Autoclave** — Autoclave Engineers Sales Corp. — is magnetically stirred and has no stuffing box.

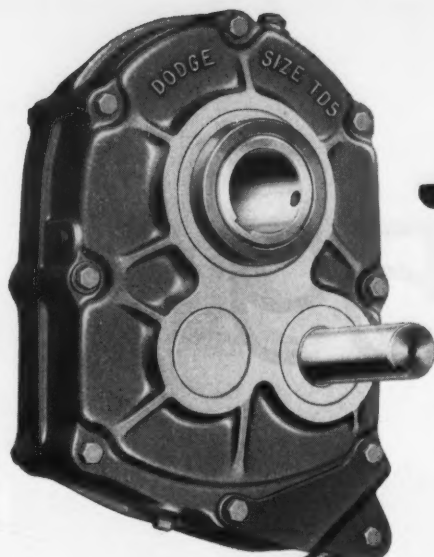
**Portable mixer** — Mixing Equipment Co. Inc. — newly engineered inside and out from top handle to propeller. Complete line to be shown. Other fluid mixers will also be on exhibit — including top- and side-entering models.

**Dissolvers** — Morehouse-Cowles, Inc. — are capable of transmitting full power to impeller at low rpm range. Variable-speed units are equipped with motors up to 40 hp. Company will also display redesigned mills.

**Vibrating screen** — NoVo Division, Industrial Enterprises Inc. — requires no lubrication or special foundation. Only the screen cloth vibrates. Frequency is as high as 2500 cps. Also on display will be vibrating dewatering filter.

**Evaporator** — A.P.V. Company, Inc. — features compact design, can handle up to 12,000 lbs per hr. Plate-type unit has very short hold-up time.

To next page



*America's Most  
Complete Line of  
Shaft Mounted  
Speed Reducers*

**55  
MODELS**

- Capacities up to 170 hp
- Output speeds from 10 to 378 rpm!
- Single Reduction
- Double Reduction
- 5 to 1 Ratio
- 15 to 1 Ratio
- 25 to 1 Ratio
- Any speed ratio up to 150 to 1 obtainable by selection of pre-determined combination of reducer and V-belt drive.

**CALL THE TRANSMISSIONEER** — your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the white pages of your telephone directory for "Dodge Transmissioneer."



# Torque-Arm

**THE DODGE DEVELOPMENT  
THAT CHANGED THE  
NATION'S HABITS OF  
SPEED REDUCTION**

In fewer than ten years, the range of Torque-Arm Shaft Mounted Speed Reducers has increased from 6 to 55 models, to meet the ever increasing demand for this improved method of speed reduction.

By eliminating foundation, sliding base and flexible coupling this modern speed reducer has saved untold installation time and untold dollars of cost.

The rugged semisteel housing developed by Dodge has never been improved upon. It is corrosion resistant—and it has the strength to hold bearing seats in line for the life of the unit.

Dodge design provides wide spacing for the bearings. Loads are carried easily, contributing to Torque-Arm's long life and very high efficiency. The gears are finest quality—helical, heat treated steel.

Torque-Arm mounts vertically or horizontally in any position around the driven shaft. It locks to the shaft on *both* sides of the housing. The holes in the output hub provide simple removal with puller. Over-load release and built-in backstop are optional.

Dodge Torque-Arm is America's most widely used shaft mounted speed reducer. It is stocked by your local Dodge Distributor. Ask him. Or write us for bulletin.

DODGE MANUFACTURING CORPORATION, 6200 Union, Mishawaka, Ind.

# DODGE

of Mishawaka, Ind.

Check 1937 opposite last page.



## Chem Show Preview

From preceding page

**Horizontal mixers** — S. Howes Co., Inc. — for processing dry and semi-liquid products. New line is available in 32 sizes. Sanitary-design mixers will also be shown.

**Agitators** — Chemineer, Inc. — can be used for mixing fluids of low viscosity through 3000 cp. Portable units are available in 26 hp-speed combinations. Turbine agitators will also be shown.

**Dryer-cooler** — Jeffery Mfg. Co. — can handle granular materials from  $\frac{1}{4}$ " down to about 60 mesh. Heat transfer is fast and efficient. Equipment is equipped with twin mass variable-amplitude mechanical vibrating drive. In addition, company will exhibit pulverizer.

**Crushers** — Franklin P. Miller & Son, Inc. — have wide degree of application, can be easily cleaned. Dry ice unit can handle 50 lb cake.

**Rotex screener** — The Orville Simpson Co. — mechanically sizes granular materials. Unit features extreme accuracy and efficiency.

**Centrifuges** — The Sharples Corporation — of various types will be on display. Styles to be shown: high-speed automatic perforate-basket, high-capacity conical-screen, scroll, disc-nozzle with recycle, sludge-discharge laboratory and others.

**Centrifuge** — Pfaudler Division, Pfaudler Permutit Inc. — self-contained test unit can handle 6000 gph. Also on exhibit will be process for clarifying waste liquids and recovering materials in liquid suspension.

**Centrifugals** — Centrico, Inc. — permit more flexible continuous processing. Production models of three lines will be on display.

**Mixer** — Prodex Corporation — fluidizes powders or granules and subjects them to high shear rates. Slashes processing time by as much as 85%. Available with 32 or 92 hp motors in 3.5 and 11.5 cu ft capacities. Company will also exhibit extruders.

**Continuous mixer** — The Strong-Scott Mfg. Co. — provides intimate mixing with intense or total dispersion. Pulverizer and ribbon blender will share spotlight.

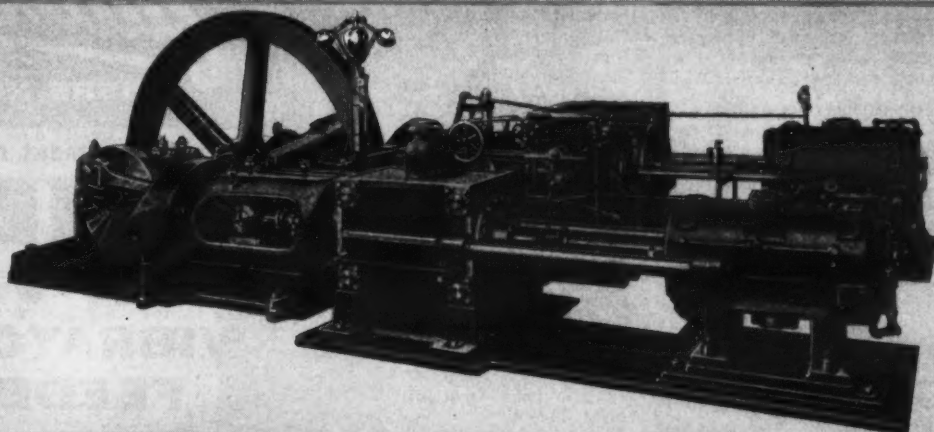
### Plant Engineering and Maintenance

Plant engineering and maintenance men should be particularly interested in inflatable metal tube to be shown by Wolverine Tube, Division of Calumet & Hecla Inc. This tube is shipped in compact strip form. Other exhibits fea-



Class FE-44 balanced-opposed four-stage 2000 hp compressor, installed in a prominent steel mill.

AS IN 1902



"Franklin" CP Compressor, Corliss engine driven, as built in 1902.

## The CP name on an Air Compressor stands for UNEXCELLED PERFORMANCE

Maintaining a good reputation requires constant improvement of the product. For more than half a century "CHICAGO PNEUMATIC" has meant unexcelled compressor performance.

CP Compressors are built in sizes to 5000 hp for pressures up to 15,000 psig, or for vacuum service. Motor or steam drive. Lubricated or non-lubricated cylinders.



**Chicago Pneumatic** 8 East 44th Street, New York 17, N. Y.

AIR AND GAS COMPRESSORS • VACUUM PUMPS • PNEUMATIC TOOLS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS

Check 1938 opposite last page.

turing new developments of general interest in the engineering and maintenance area:

**Horizontal steam-jacketed pump** — Lawrence Pumps Inc. — can be dismantled without disturbing either suction or discharge pipe. Vertical top-suction pump and horizontal propeller model will also be on display.

**Variable-speed drives** — The Cleveland Worm & Gear Co. — provide infinitely variable output speed over range to 9:1, from constant-speed power source. In addition, fan-cooled worm and gear speed reducers are to be featured.

**Ball valves** — Jamesbury Corp. — of ductile iron and alloy 20 are additions to regular line.

**Quick coupling** — Ever-Tite Coupling Co. Inc. — is double-shut-off type.

**Valve** — The Galigher Company — for controlling and shutting-off flow of slurries, acids and other corrosive materials, employs operation using air or liquid, either manually or by a set of automatic controls and regulators. Squeeze valve will be on display too.

**Double-spindle tube-expander** — The Airetool Mfg. Company — permits rolling of tubes at rate of 30/min.

**Nylon Goodloe column packing** — Packed Column Corporation — is for use where contact with metals must be avoided.

**Exotic metal tube** — Wolverine Tube, Division of Calumet & Hecla Inc. — is constructed from niobium, tantalum, vanadium and molybdenum.

**Centralized lubrication systems** — The Farval Corporation, Affiliate of The Cleveland Worm & Gear Co. — provide positive mechanical method of dispensing oil or grease, under pressure to group of bearings, from one central location.

**Liquids filler** — Cherry-Burrell Corporation — is for containers with openings of 27 mm to 6" diam, in round or rectangular shapes.

**Expanded metal partitions** — Products Div., The Globe Co. — are of welded construction.

**Aluminum serrated flanges** — Speedline Fittings Division, Horace T. Potts Company — require only rolling-in operation to give leak-proof joint. Aluminum unions are also to be shown.

**Adjustable-pitch fans** — National Drying Machinery Co. — have Venturi-tube fan collars.

**Refrigeration compressor** — Frick Company — of two-stage type and evaporative condenser for conserving water will be featured at this booth.

To next page

Designed to  
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**PARTICULAR**  
**APPLICATION**

**ERIEZ**

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**MAGNETIC PULLEYS**

Now available with magnetic elements of lifetime-powered Alnico V or new Ceramic materials — to assure you the most effective installation for your particular application!



Only Eriez — with its years of know-how based on solving magnetic problems of all types for industry — offers such a wide range of PERMANENT MAGNETIC PULLEYS to meet your specific needs. Remove tramp iron or iron fines efficiently, economically, automatically! Size for size, Eriez Pulleys provide two to three times greater magnetic fields than limited radial center air gap units. Magnetic strength unaffected by heat or cold. No "weak spots" . . . magnetic strength extends across entire Pulley face. Standard sizes range from 4" diameter thru 30" diameter and in many belt widths.

**NO OPERATING OR MAINTENANCE COSTS**  
• EFFECTIVE FOR WET OR DRY MATERIALS  
• EASILY, QUICKLY INSTALLED ON NEW OR EXISTING EQUIPMENT • PROVED IN THOUSANDS OF APPLICATIONS IN EVERY TYPE OF INDUSTRY.

Be sure of getting the most effective unit for your exact needs. Contact us: we'll work closely with your engineers to provide peak performing magnetic equipment at the most economical cost to you.

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Eriez Mfg. Co., 73-YB Magnet Drive, Erie, Pa.



Check 1939 opposite last page.

## Chem Show Preview

From preceding page

**Positive-displacement pump** — Waukesha Foundry Company — has all product-contact parts in stainless steel.

**Positive-displacement pump** — Goodyear Pumps Inc. — is non-foaming and pulseless. Portable fire pump will share spotlight here.

**Bearing material** — General Plastics Corporation — which is Teflon-reinforced can be machined in conventional manner. Also to be shown: Impregnated braided-glass sleeving, plastic-impregnated braided-asbestos tube, Teflon-fiber felt for gaskets and seals, Teflon-impregnated glass fabric, and coatings of Kel-F and Teflon.

**Positive-displacement pump** — M. J. Seavy & Sons — can be used to deliver fluids or proportion them at pressures to 50,000 psi. Sharing display will be thickness and density gages.

**Sanitary pump** — Sonic Engineering Corporation — is stainless-steel high-pressure type, utilizes double-helical gears of stainless-steel, specially alloyed to prevent galling.

**Polyethylene shipping containers** — Delaware Barrel & Drum Company — of closed-head type may also be used for storage. Open-head type is available for bulk storage or processing.

**Reactors** — Pfaudler Division, Pfaudler Permutit Inc. — are fabricated from Glasteel and alloy.

**Centrifugal chemical pumps** — Worthington Corp. — in ½ and 8" sizes, are constructed entirely of highly alloyed stainless steel. In addition, ductile-iron centrifugal pumps may be seen.

**Tangential stainless fittings** — Flowline Corp. — may be attached in line by rolled-on flange connection, fillet welding, Vic-taulic coupling or butt welding.

**Centrifugal pumps** — Alsop Engineering Corporation — for capacities of 10 to 80 gpm and pressure range of 0 to 60 psi.

**Gravity filler** — Ertel Engineering Corp. — will not collapse or distort containers. Stainless-steel self-priming gear-type pump will also be on exhibit.

**Condenser-tube cleaners** — Aire-tool Mfg. Company — are available with variety of cleaning heads.

**Elemental amorphous carbon** — Barnebey-Cheney Company — is in fiber form. Uses: absorptive cloth, air filters and catalyst support.

**Remote-control fume hood** — Duralab Equipment Corp. — for purging obnoxious odors is automatic air-by-pass type.

**Dust-collector** — The W. W. Sly Mfg. Co. — has been completely redesigned.

**Tank vent** — Filtros Incorporated — has component parts suitable for venting of hydrogen-peroxide storage tanks. Water filter can be seen here also.

**Cloth filter collector** — Dustex Corp. — of self-cleaning type has air-to-cloth ratios which have been maintained at 20 to 25 cfm/sq ft of cloth, with constant pressure drop. In addition, economy collector will be displayed.

**Scrubber** — Western Precipitation Corporation — collects dust and fumes at relatively low water rates. Filter, for handling high-temperature gases and dust and fume particles, in cement plants and rock-processing operations, will share limelight.

**Booster jet cleaner** — Sellers Injector Corporation — operates on inlet steam of 5 to 50 psi. Discharge-pressure range is 100 to 200 psi, with temperatures of 160 to 210°F. Spinner jet is second item to be found at booth.

**Flow filter** — Jacoby-Tarbox Corporation — is non-sloughing and has uniform structure. Collection of solids can be observed.

**Sealed-disc filter** — Alsop Engineering Corporation — is provided with built-in sludge accumulation space. A 500-gpm-flow-capacity filter, single- and multiple-element assemblies, and unit for filtration and dehydration of petroleum-type liquids will be co-featured.

**Heat exchanger** — Cherry-Burrell Corporation — is of scraper-blade type, with processing range from -50 to +350°F.

**Air-evaporative cooler** — National-U.S. Radiator Corp. — cools H<sub>2</sub>SO<sub>4</sub>. Construction incorporates internal and external finned cast-iron sections.

**Heat-transfer cement** — Thermon Manufacturing Company — is water-resistant and non-hardening type for process-line and equipment cooling with external tube tracer lines.

**Heat-exchanger coil** — Platecoil Division, Tranter Manufacturing, Inc. — of plate type has been redesigned for higher operating pressures and faster heat-up.

**Heat-transfer systems** — American Hydrotherm Corp. — are for industrial heating and cooling from -100 to +700°F in pressureless systems.

**Impervious graphite heat exchanger** — The Carbone Corporation — is now being manufactured in 6, 13 and 24" sizes, with areas 1.35 to 576 sq ft/unit.

**FEEDER**

OF THE

*future*

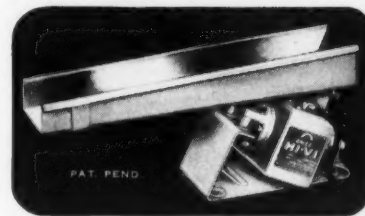
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**VIBRATORY  
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Award-winning feeder... features new concepts in design and use of materials. Priced right; provides superior performance; lower operating costs; reduced maintenance and greater production output! For automatic, accurate feeding of all types of bulk materials. Variable feed rate from ounces to tons... performs spreading, aerating, cooling, proportioning, screening, other operations.

**NEW A.C. ELECTRO-PERMANENT MAGNETIC DRIVE PROVIDES GREATER FEEDING CAPACITY - NO RECTIFIER NEEDED - FULLY ENCLOSED POWER ELEMENT PROTECTED AGAINST DUST AND MOISTURE - RUGGED GLASS FIBER SPRINGS REDUCE BREAKAGE - FULLY PROVED IN PLANTS EVERYWHERE**

**ALSO AVAILABLE:** Economical, specially constructed units for hazardous, dusty locations... fully acceptable by Mill Mutual.

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Eriez Mfg. Co., 73-YA Magnet Dr., Erie, Pa.



Check 1940 opposite last page.

CHEMICAL PROCESSING



**Cooler** — The Orville Simpson Co. — handles granular materials.

**Electrically heated oven** — Trent, Inc. — can be furnished with only such accessories as needed. Electrically heated pipe jacket is also to be shown at this display.

**Heat-exchanger coils** — Dean Thermo-Panel Coil Division, Dean Products, Inc. — of plate type have improved inlets and outlets for greater capacities. Fittings for these coils will share feature billing here.

**Industrial ceramic** — General Ceramics Corp. — is for service to temperatures as high as 1000°F. Hydrostatically balanced mechanical seals for centrifugal pumps and porous ceramics are slated to share display.

**Penton tube fittings** — The Imperial Brass Mfg. Co. — will be exhibited along with Hytron hose and couplings and a shut-off needle valve for use on tube installations.

**Plastic pipe and fittings** — Fiber-cast Company — which are epoxy-resin glass-reinforced type, are for service to 1000 psi and 300°F. Structural pipe and fittings are other items to be shown.

#### Petrochemicals

Compressors, valves, pumps, and instruments, along with other equipment suitable for petrochemical plants will be exhibited.

**Diaphragm compressors** — Lapp Insulator Co., Inc. — will handle inert or corrosive gases at pressures up to 5000 psig. Ceramic pipeline strainer is suitable for dilute acids.

**Diaphragm compressor** — Autoclave Engineers — has no stuffing box, does not mix oil and gas, does not leak gas.

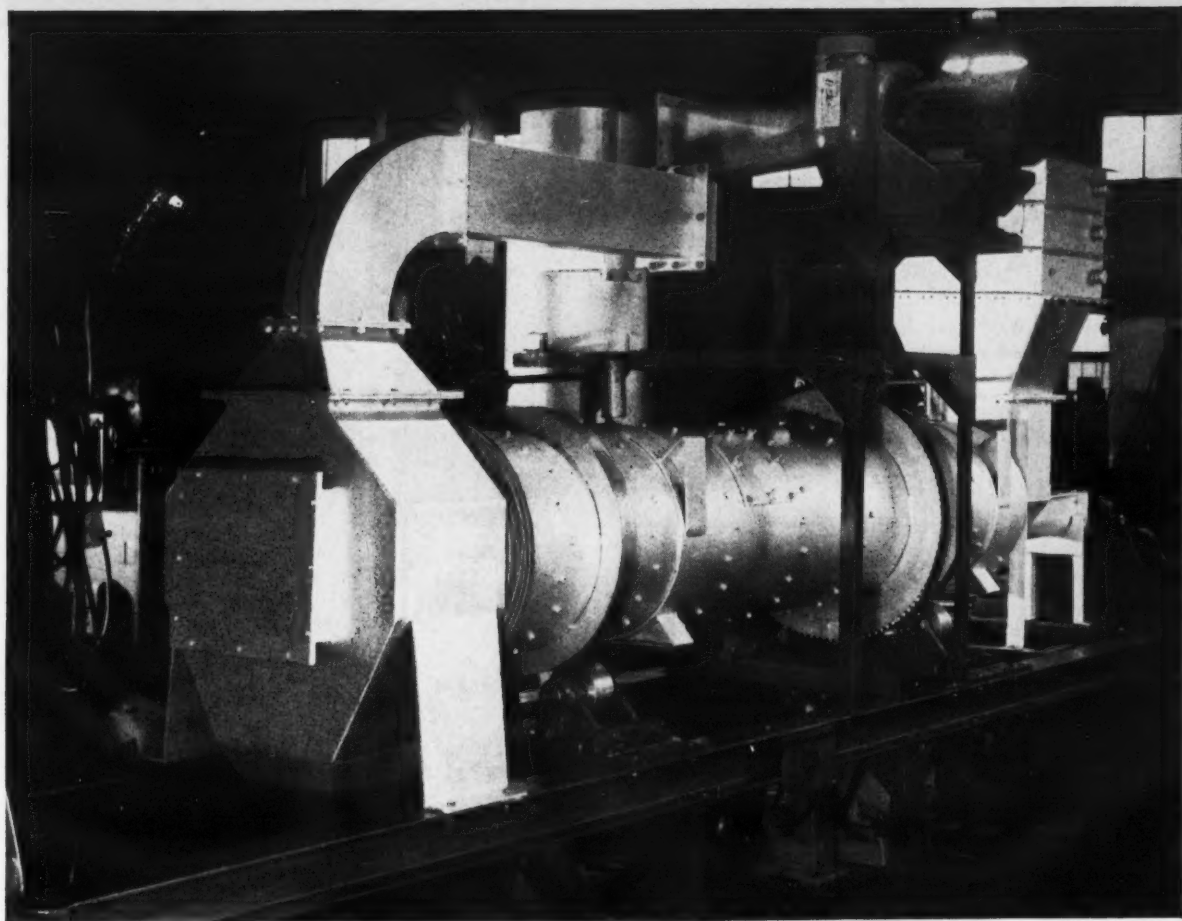
**Valves** — Walworth Company — include new line made from PVC. Others are push-button, motor-operated 18" steel gate valve and 24" iron-body, motor-operated, lubricated plug valve.

**Ball valves** — Hills-McCanna Company — have self-adjusting seats. Diaphragm pump will handle toxic, exotic, or valuable products. Elimination of entrained air is assured.

**Proportioning pumps** — Blackmer Pump Company — provide accurate measurement of liquids at pressures to 125 psi and flow rates from 10 to 1000 gpm. Variable volume pumps will also be shown.

**Turbidity indicator** — Jacoby-Tarbox Corporation — can be installed directly in pipelines.

**Viscometer** — Norcross Corporation — is also suitable for pipeline applications.



Pilot-scale Louisville Dryer available on rental or purchase basis

## FOR RENT PILOT PLANT DRYERS AND MIXERS

Rent this equipment when

1. The material changes physically or chemically on aging.
2. The material is hazardous and requires special handling by your own personnel.
3. Long duration tests are required for equipment evaluation.
4. Completion of a pilot plant is required at no additional capital expense.
5. Product security prevents release of samples.
6. Large quantities of finished product are needed for application studies.

Units are fabricated of stainless steel and are self-contained. Rental charges may be applied against purchase of production-sized equipment.

General American engineers will give technical assistance. If in-plant testing is not required, you can predetermine results at our complete East Chicago pilot plant. For further information, call or write. You'll find, it pays to plan with General American.

#### Available:

Louisville Steam Tube Dryer	(1' x 8')
Louisville Rotary Reactor	(1' x 8')
Louisville Rotary Solvent Stripper	(1' x 8')
Louisville Rotary Vacuum Dryer	(1' x 8')
Louisville Direct Heat Dryer	(1' x 8')
Turbo RDC Extraction Column	
Turbo Bench Scale and Small Pilot Mixers	

Process Equipment Division  
**GENERAL AMERICAN TRANSPORTATION** **LOUISVILLE DRYERS CORPORATION**

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Check 1941 opposite last page.

# Steady filtration FULLY AUTOMATED

NIAGARA Filters are available in completely automated models for production-line filtration. Operating with process streams from 5 to over 1,000 gallons per minute, these highly efficient, versatile filters adapt easily to automatic processing of many materials like these:



Speedy cake removal, elimination of manual cloth washing and totally enclosed construction are NIAGARA advantages which are helping save time and improve product quality in all areas of the processing industry. For more complete data, see NIAGARA's section in Chemical Engineering Catalog or write:

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Specialists in liquid-solids separation

Check 1942 opposite last page.



## recent books

reviews of current technical and reference work  
... summarized for you by authorities in the  
field with the CP staff

### Radioisotopes for Industry

With the uses of radioisotopes rapidly rising, this book should be quite popular. Aimed at helping the reader find use of radioisotopes in his own work, the 190-page book describes a multitude of applications.

In addition to uses, there are discussions on safety, facilities for handling radioisotopes, and setup costs. Book has 12 chapters, four appendixes, and an index.

Written by Robert S. Rochlin and Warner W. Schultz, both of General Electric Company, the book is well illustrated with photos, charts and drawings. It is easy to read — containing a minimum of highly technical discussions. No prior knowledge of nuclear science is necessary to understand it.

Included in the applications discussed are gaging, wear measurements, finding leaks, use of tracers in research, and many others. The book should be an asset to the library of all engineers.

To obtain "Radioisotopes for Industry" remit \$4.75 direct to Reinhold Publishing Corp., 430 Park Avenue, New York 22, New York.

### Structure of Electrolytic Solutions

Reviewed by  
D. S. DAVIS  
University of Alabama

"The Structure of Electrolytic Solutions" reflects a symposium held in Washington, D.C., in 1957, sponsored by the Electrochemical Society and The National Science Foundation. In a brief but informative introductory chapter the editor, Walter J. Hamer of

the National Bureau of Standards, traces early history of electrolytic solutions and orients the reader with respect to the classical work of Grotthaus, Davy, Faraday, Daniell, and other pioneers.

This 441-page book consists of 27 chapters and is the work of 42 internationally known contributors who deal in a most scholarly manner with dilute and concentrated solutions, fused electrolytes, kinetics of electrolytic solutions, activity and osmotic coefficients, solvation and transfer of ions, polyelectrolytes, ionic crystals, aquo-ions, and thermodynamic considerations.

To obtain "The Structure of Electrolytic Solutions", remit \$18.50 direct to John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. Check 1943 opposite last page.

### Chemical Reactions

Reviewed by  
ANDREW J. SNYDER  
University of Alabama

This 533-page book is the eighth and final volume of a series started by the late Professor C. A. Jacobson, West Virginia University. After his death the series was continued and completed by Clifford A. Hampel, editor of "Rare Metal Handbook."

Volume VIII includes entries on reactions of tungsten, uranium, vanadium, ytterbium, yttrium, zinc, and zirconium. About one-half of the volume, the Addenda, is comprised of entries received subsequent to publication of previous volumes.

This volume, along with previous volumes, has its good and bad features. One can quickly determine whether or not a given reaction has been

carried out. However, if the reaction has been carried out, very little or no information is given beyond the equation. Information as to reaction rates and conditions, applications, properties, and yields would necessitate looking up the original article or some unlisted articles, in the literature.

To obtain Volume VIII of "Encyclopedia of Chemical Reactions", remit \$14.00 to the Reinhold Publishing Corp., 430 Park Ave., N.Y. 22, N.Y.

## Thermodynamics

Reviewed by  
C. K. Liu  
University of Alabama

This 567-page text on thermodynamics by Gordon J. Van Wylen is an excellent and welcome addition to the many books on this particular subject in the field of engineering and physical sciences.

An individual cannot help noting the special features of this text which sparkle through the dense thermodynamic atmosphere. It uses a new arrangement of subject matter; it introduces the general equation of the first law of thermodynamics early, and shows its easy reduction from transient to steady state conditions; it has an excellent clarification on the subject of reversibility; it makes a special effort in presenting entropy.

The book emphasizes the principles that underlie thermodynamic phenomena, rather than the technological descriptions of the devices in which the phenomena take place. There are included a number of well-presented topics, such as availability, chemical equilibrium, and thermodynamic relations.

The whole text is written by an author who anticipates well the mind of the reader. In some sections, abstract concepts are effectively introduced through down-to-earth, person-to-person discussion.

Book consists of 16 chapters,

three appendices, eight tables in the text and 11 in the appendices, 123 illustrative examples, 308 problems (90 of which have answers given), and one psychrometric chart.

To obtain "Thermodynamics," remit \$7.95 direct to John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, New York.

Check 1944 opposite last page.

## Organic Coatings

Information for those who may benefit from the use of hot organic coatings — such as asphalt, coal-tar pitch, petroleum waxes, and cellulose derivatives — is presented in 233-page book. Theory has been de-emphasized in order to provide space for application data.

Author is Raymond B. Seymour, President, Alcyline Plastics and Chemical Corporation. Mr. Seymour has been associated with the plastics and coatings industry for 25 years and is well qualified to write this type of book.

To obtain "Organic Coatings," remit \$7.50 direct to Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y.

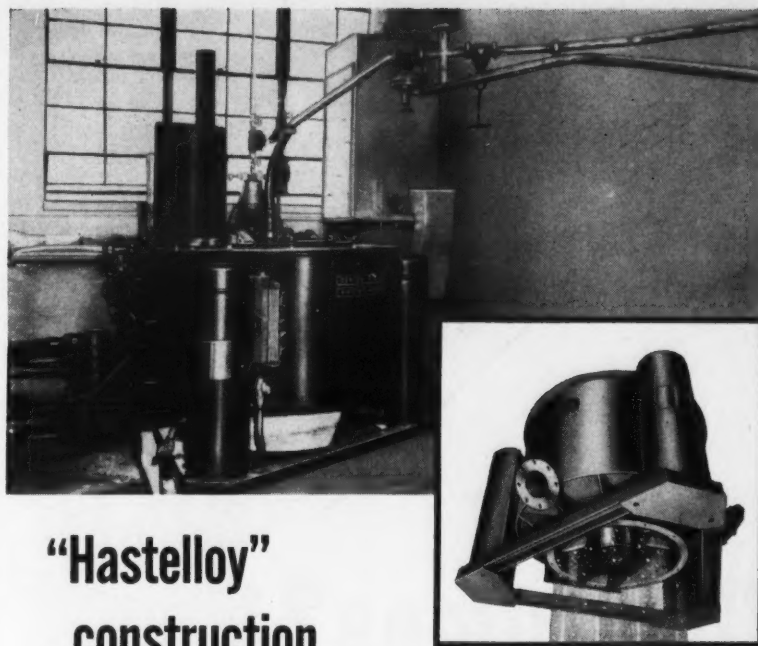
## Corrosion of Chemical Apparatus

Translated from Russian, 250-page book covers corrosion cracking of metals and methods to prevent it. Book is intended for those concerned with corrosion of chemical equipment.

Metals covered include carbon and alloy steels, stainless steels, chromium-nickel steels, and non-ferrous metals and alloys. Authors are G. L. Shvartz and M. M. Kristal.

To obtain "Corrosion of Chemical Apparatus," remit \$7.50 direct to Consultants Bureau, Inc., 227 W. 17th St., New York 11, N. Y.

Check 1945 opposite last page.



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## RECENT BOOKS

### Comprehensive Analytical Chemistry

Reviewed by  
D. S. DAVIS  
University of Alabama

The Wilson brothers, Cecil L., and David W., propose to reappraise the field of analytical chemistry in five volumes. This first volume is devoted to classical analysis. It draws on work of seventeen internationally known contributors and deals with analytical processes, gas analysis, organic and inorganic qualitative analysis, and inorganic gravimetric methods.

One cannot fail to be favorably impressed by excellent chapters on sampling and statistics by Tomlinson and Wood, respectively, and by chapters on weighing (Hodsmann) and measurement of volume (Goulden), to mention only a few.

Throughout, organization is sound, line cuts are good and tables are easy to follow. Authoritative bibliographies and lists of references wind up each chapter. Subject index is properly detailed.

To obtain "Comprehensive Analytical Chemistry, Vol 1A," remit \$14.50 on subscription basis, or \$17.50 for the single volume, to Elsevier Publishing Company, 257 Fourth Ave., New York 10, New York.

Check 1948 opposite last page.

### Gas Chromatography

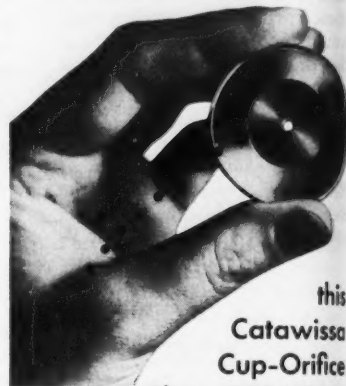
Reviewed by  
JOHN A. FAVRE  
Phillips Petroleum Company

An excellent picture of current developments in the gas-chromatography field is presented in this volume. Adequate discussions of theoretical principles used are given in early chapters.

The reviewer does not agree with the opinion that peak heights are less accurate than area measurements, in view of a recent test program with twelve cooperators. Both

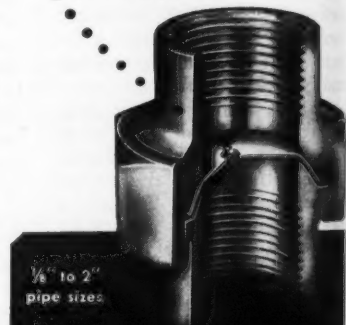
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Check 1949 opposite last page.  
CHEMICAL PROCESSING

## RECENT BOOKS

methods are very useful for reducing chromatograms to quantitative data.

The 226-page book includes 76 pages listing manufacturers (with mailing addresses), bibliography and index. Organization, composition and illustrations are excellent. The book is recommended for beginners and those with limited experience in gas chromatography.

To obtain "Principles and Practice of Gas Chromatography," remit \$6.75 to John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.

Check 1950 opposite last page.

### Chemical Kinetics and Reactivity

Reviewed by  
LAWRENCE J. HEIDT  
Department of Chemistry  
Massachusetts Institute of Technology

Written by N. N. Semenov, Institute of Chemical Physics, Academy of Sciences of the USSR, and translated by Dr. J. E. S. Bradley, this book reveals an authoritative point of view regarding interpretations and working hypotheses in the realm of chemical kinetics.

The reviewer found the chapters on a) Ions of Variable Valency as Chain Initiators and Wall Initiation and b) Retardation of Chain Reactions to be of especial interest. Emphasis is placed upon physical as well as chemical concepts regarding these phenomena and the application of these concepts to heterogeneous catalysis.

The 305-page book, with 31 figures and 42 tables, consists of three main parts:

Part I. Radical Reactions (Propagation and Branching of Chain Reactions), with chapters on Uniradical Reactivities, Alternative Univalent Free-radical Reactions, and The Reactions of Biradicals.

Part II. Initiation and Termination of Chain Reactions, with chapters on Molecular Dissociation and Radical Com-



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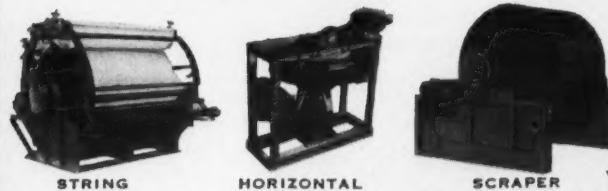
The FEInc filters in this installation are examples of how custom-made units provide solutions to many difficult continuous filtration problems in the chemical processing industry.

For help with your problem, see our insert in Chemical Engineering Catalog or write today, Dept. CPF-1159, for free bulletins and technical advice. Simply state your basic requirements.

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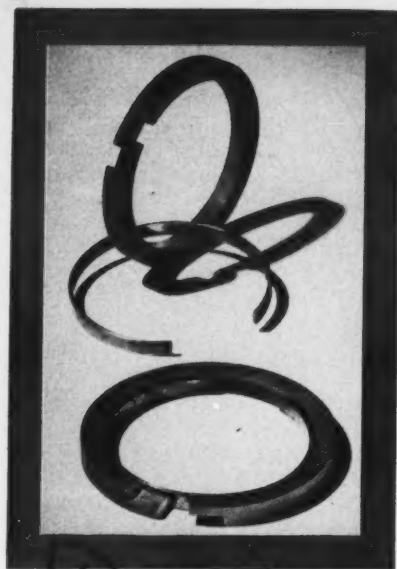
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Check 1951 opposite last page.



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Check 1952 opposite last page.

## RECENT BOOKS

bination, Ions of Variable Valency as Chain Initiators and Wall Initiation, and Retardation of Chain Reactions.

Part III. Kinetics of Chain Reactions, which consists of a chapter on Chain Reactions Competing with Reactions between Saturated Molecules.

Appendices on The Activated Complex and The Quantum-mechanical Calculations of Activation Energies are included.

To obtain "Chemical Kinetics and Reactivity, Vol I," remit \$7.50 direct to Pergamon Press, Inc., 122 East 55th Street, New York 22, New York.

Check 1953 opposite last page.

## Nomograms for Chemical Engineers

Reviewed by  
D. S. DAVIS  
University of Alabama

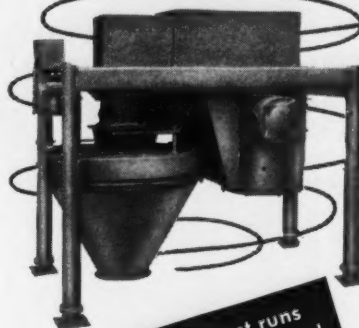
O. P. Kharbanda has given us the first collection of nomographs devoted exclusively to chemical engineering since 1944. In 247 pages he presents 96 carefully selected charts that are truly nomographic, ably augmented with seven that are not. All are drawn from engineering journals and previous collections, but only 11 have appeared since 1955.

Noteworthy features are 8½ x 11" pages bound with a spiral wire to lie flat when in use, chart and descriptive matter on the same page or on facing pages, large numerals, lack of crowding for both scales and legends, and inclusion of a plastic isopleth, which unfortunately bears English and metric scales that are in error.

Three classes of charts are presented: those that deal with physical properties; with unit operations; and with combustion, properties of petroleum fractions, and design of vessels.

A good feature is that many of the nomographs are reproduced in a size larger than that of their first and second publications in journals and other books. Surprisingly, for

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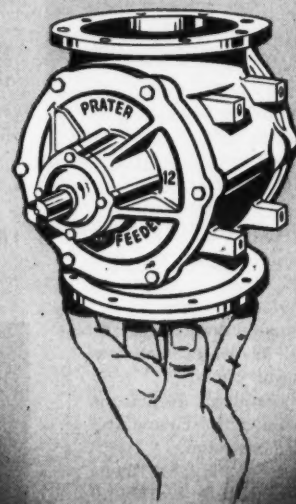
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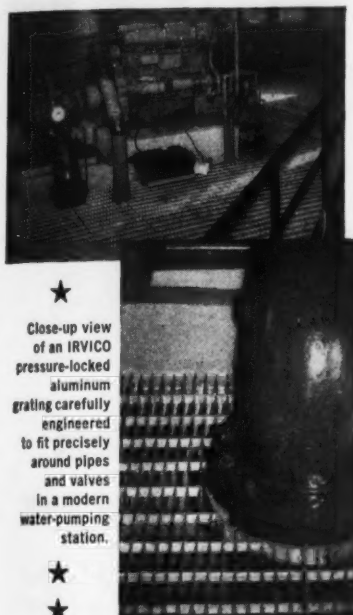
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Check 1955 opposite last page.

CHEMICAL PROCESSING



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Check 1956 opposite last page.

NOVEMBER 1959

## RECENT BOOKS

material edited and printed in England, all but a dozen of the nomographic charts appeared originally in American publications.

To obtain "Nomograms For Chemical Engineers", remit \$15.00 direct to Academic Press, Inc., 125 East 23rd Street, New York 10, N. Y.

Check 1957 opposite last page.

## American Petroleum Refining

This 538-page volume was written to provide the latest information in concise form on petroleum refining.

It includes data on chemical and physical properties of hydrocarbons. Material on processes includes flow charts and operating data. Author is H. S. Bell, consulting engineer.

To obtain "American Petroleum Refining," Fourth Edition, remit \$12.50 to D. Van Nostrand Company, Inc., 120 Alexander St., Princeton, N. J.

Check 1958 opposite last page.

## Steroids

Reviewed by  
CARLTON D. WHITT  
Athens College

This 945-page book by Louis F. and Mary Fieser of Harvard University, collects and condenses widely scattered literature into one coherent well-organized volume. The book also includes much unpublished work by world authorities in the field. Up-to-date coverage is emphasized by the more than 600 references since 1956, of which about 10 percent are for 1959. At least 2000 of the more than 3500 references to original sources of information are since 1949.

First chapter serves to orient the reader in structural aspects of steroids and methods for determining spatial configurations. Study of various families of steroids is

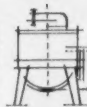
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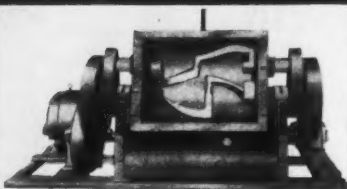


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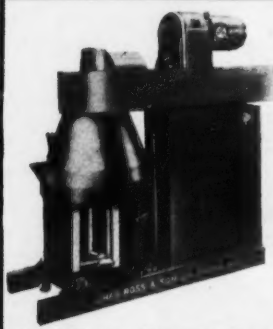
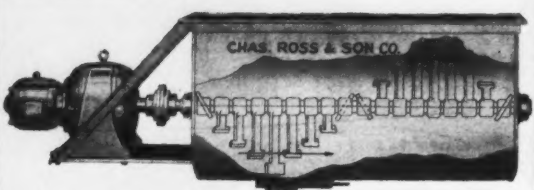


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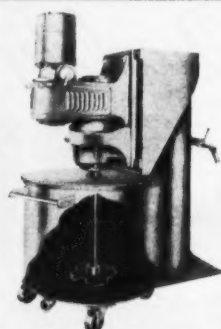


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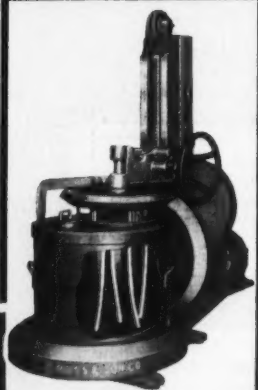
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Check 1960 opposite last page.

## RECENT BOOKS

then undertaken. Physical methods available for working out steroid structures, methods of characterization, and general reactions of steroids are adequately presented for those who have been away for some time from active work in the field.

This book should be of particular value to students and workers in biochemistry and research. Though "Steroids" primarily covers the chemistry of special materials, the authors also have managed to include a surprising amount of information covering biological and physiological functions of these materials.

To obtain "Steroids," remit \$18.00 to Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N.Y.

## Linear and Stereoregular Addition Polymers

Reviewed by  
D. S. DAVIS  
University of Alabama

Norman G. Gaylord, of Interchemical Corporation, and Herman F. Mark, of Polytechnic Institute of Brooklyn, present the last word on polymerization with controlled propagation.

Incorporated in 571-page volume is review of polymerization kinetics, adsorption on surfaces, requirements for stereo-specific polymerization, structure of solid olefin polymers, solution properties of linear polyethylenes, fluid- and fixed-bed processes, polymerization of olefin oxides, physical properties of olefin polymers, patent examples and miscellaneous organo-metallic-catalyzed systems.

Each of eighteen chapters is fortified with bibliography that is valuable in itself. Tabulated patent examples give wealth of information in compact, convenient form.

To obtain "Linear and Stereoregular Addition Polymers," remit \$17.50 to Interscience Publishers, 250 Fifth Ave., New York 1, N. Y.

Check 1961 opposite last page.



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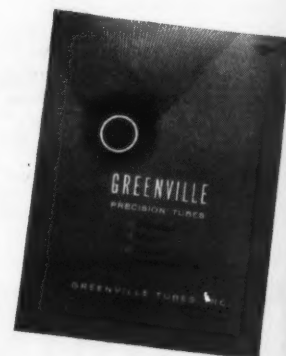
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Check 1962 opposite last page.

CHEMICAL PROCESSING

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erine, 70 g mint water and 30 g vodka."

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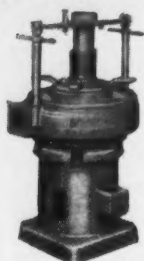
#### Technical data available:

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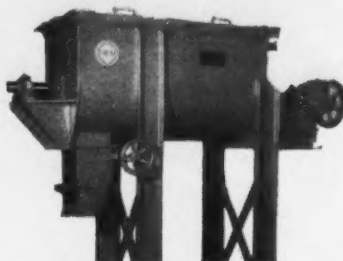




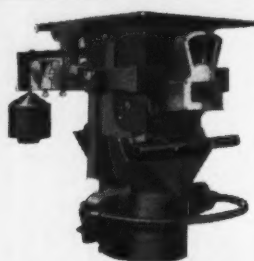
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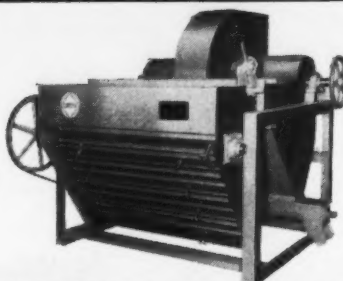
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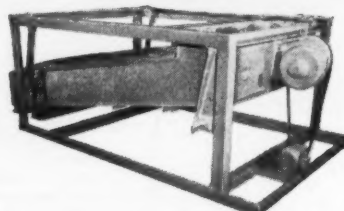
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Check 1964 opposite last page.

## RECENT BOOKS

### Colorimetric Methods of Analysis

Reviewed by  
D. S. DAVIS  
University of Alabama

This fourth edition of "Colorimetric Methods of Analysis," by Foster Dee Snell, Cornelia T. Snell, and Chester Arthur Snell, deals exhaustively with significant work published between the appearance of Volume II of the third edition and January 1956. The increased sensitivity of flame photometers now amply warrants inclusion of flame photometric methods.

Forty-eight chapters are concerned with elements; twenty are directed to important groups and compounds. Each chapter starts with a brief but informative survey paragraph. Thereafter, text matter is organized as to 1) samples of materials in which the element, group, or compound occurs, 2) general methods and detailed procedures, and 3) presentation of miscellaneous aspects of the colorimetric determinations.

This 793-page volume, which includes 13 tables, 32 figures, 31 pages of author index, and 25 pages of subject index, is an important digest of colorimetric methods of inorganic analysis.

To obtain "Colorimetric Methods of Analysis, Vol IIA," remit \$15.00 direct to D. Van Nostrand Co., Inc., 257 Fourth Avenue, New York 10, New York.

Check 1965 opposite last page.

### Precipitation from Homogeneous Solutions

Reviewed by  
DR. SAMUEL P. MASSIE  
Fisk University

In recent years, the techniques of precipitation from homogeneous solution have found increasingly widespread use. Doctors Gordon, Salutsky, and Willard, men who have contributed much in this

## A filter man's thinking about missiles: How vulnerable is fuel purity control?

Today's missiles have prodigious appetites, exotic tastes... and delicate innards. The possible consequences of improper diet are alarming. The usual ration of liquid fuels—ultra-cold, explosively volatile—is tough to handle. But the fact is: fuel purity control has proved to be one of missile's least vulnerable functions. Why? Largely because the humble filter has grown in stature lately.

We know. We make them.

We know it's no accident that filters are available to separate any particle larger than 10 microns from a torrent of corrosive 'LOX'—at -267°F. It's no accident that Purolator can offer industry a filter for liquid helium—to operate at -420°F and 10,000 psi—structurally rugged, compact, easy-to-clean. These are the fruits of years of research into extreme low temperature filtration. We anticipated defense and industrial needs...shaped yesterday's bold concepts into today's practical Purolator equipment. What kind of filters are these? No one kind, of course; they must be tailored to specific applications. But we're working with such media as

(1) frameless metal edge elements—exceedingly strong, unitized structures which we can make out of inconel, monel, platinum, tantalum, many stainless steels, etc. Such media can be operated through tremendous ranges—in some cases from -420°F to 1200°F...or where the temperature change is on the order of 300°/second. Built-in venturi action permits them to handle terrific volumes of fluids with extremely low differential pressures.

(2) fused, porous metal media—with remarkably uniform pore sizes ranging upward from a fraction of a micron.

(3) fibrous metallic media... exotic plastic materials of all kinds... combinations of these and the above.

We can't begin to tell you—in this column—about the full scope of Purolator's activity in liquid gas applications, or other areas that may interest you more. But our brochure called "New Roles for Filtration" makes good reading. And our "Filter Media Selection Chart"—giving corrosion and temperature factors for all known media—is a valuable reference to have on hand. Write us for either or both. They're yours for free.

*Jules P. Kovacs*  
Jules P. Kovacs, V. P.

Filtration For Every Known Fluid

**PUROLATOR**

PRODUCTS, INC.

Rahway, New Jersey and Toronto, Ontario, Canada

Check 1966 opposite last page.

CHEMICAL PROCESSING

field, have done an excellent job of compiling and editing information about the subject in this 187-page book.

Six chapters describe methods of precipitating certain anions: basic salts and hydroxides, phosphates, oxalates, sulfates, sulfides, and some miscellaneous anions. Stress is placed on the improved nature of precipitate with regard to uniformity of particle size, filterability, ease of washing, and purity which can be achieved in controlled precipitation.

There follows a 32-page chapter on co-precipitation and a 24-page chapter on fractional precipitation, both from homogeneous solutions.

Book concludes with summary of applications in chemical technology, particularly improvement of the Curie method for obtaining radium.

Each chapter has literature references at its end and the literature is reviewed through 1957. Since the authors carried out much of the research, there appear many interesting facts which as yet have not been published. Book is well-indexed, both for author and subject.

To obtain "Precipitation from Homogeneous Solutions," remit \$7.50 direct to John Wiley and Sons, 440 Fourth Avenue, New York 16, New York.

Check 1967 opposite last page.

"Industrial Fatty Acids and Their Applications" includes chemistry, processing and the production of fatty acids with emphasis on practical technology. Edited by E. Scott Pattison, Manager, Fatty Acid Producers' Council, the book reflects growing industrial importance of fatty acids and derivatives having commercial applications.

To obtain "Industrial Fatty Acids and Their Applications" remit \$7.00 to Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N.Y.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

### Brief Course In Organic Chemistry

Reviewed by  
DANA S. DAVIS  
*The Champion Paper and  
Fibre Company*

This second edition of the text, prepared by professors Lyell C. Behr, Reynold C. Fuson, and Harold R. Snyder, is a compact introduction to the study of carbon compounds.

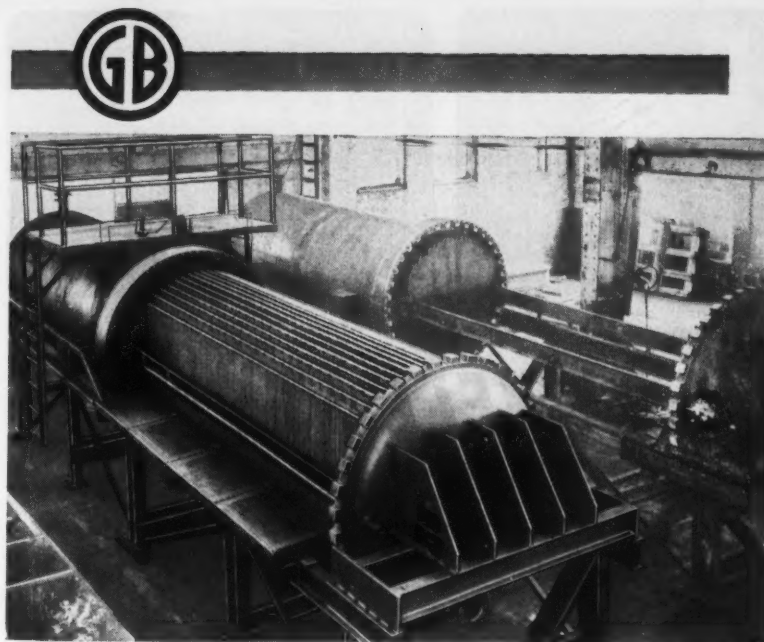
The authors have successfully related in 20 chapters, sharing 289 pages, a short course on the subject for any pre-professional students in the areas of medicine, agriculture and home economics.

Complete coverage includes adequate discussions of important concepts of valence, structure, saturation, isomerism and mechanisms. Three new chapters that appear are "Homologous Series," "Naturally Occurring Esters" and "Sulfur Compounds."

Drawings of many structural models are incorporated. Of considerable interest are photos depicting industrial operations.

To obtain "Brief Course in Organic Chemistry," remit \$5.75 to John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N.Y.

Check 1968 opposite last page.



## G-B Retractable Shell-Type Filter Clarifies green Sodium Aluminate Liquor

This new filter, the retractable shell, is designed for filtering under pressure. Originally developed for the aluminum industry, this unit has proved to be extremely successful for clarifying green sodium aluminate liquor. Perhaps the most unique feature is the fact that filtrate lines need never be broken, but are permanently connected to achieve high pressure filtration without leakage. The retractable shell filter is available now for all types of process problems. Pressures up to 100 psig, sizes to 3000 sq. ft. Generally constructed of steel; however, it can be built from stainless steel and other specified metals.

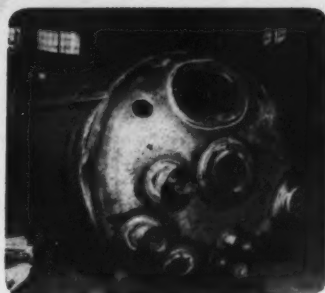
Write for more complete information.



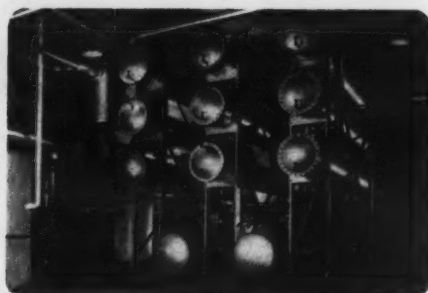
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MANUFACTURING CO., INC.  
BIRMINGHAM, ALABAMA

**FILTERS • EVAPORATORS  
PROCESS EQUIPMENT  
CONTRACT MANUFACTURING  
including HEAVY CASTINGS**

Check 1969 opposite last page.



Frick reactor shells are built by ASME qualified welders.



Condensers, Receivers, Oil Separators, Gas and Liquid Coolers, Accumulators, and Pre-coolers are furnished in all sizes.

## for SHELL VESSELS

Look to



Engineers

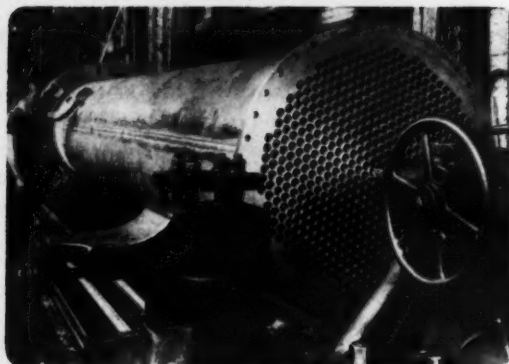
With 106 years' experience in building pressure vessels, from boilers to reactors, we're able and ready to fill all your needs. We have the shears, planers, power rolls, automatic welders and mechanics to do this type of work.

Write for recommendations and estimates on your shell vessel work to . . .

WAYNESBORO, PENNA. U.S.A.  
**FRICK Co.**



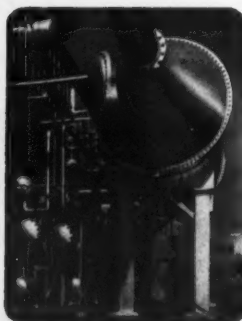
Frick vertical shell condensers.



Machining the head for a shell and tube vessel in the Frick shop.



Automatic welder used on a shell and tube vessel in the Frick shops at Waynesboro, Penna.



Compressed air for a wind tunnel conditioned with Frick equipment.

Check 1970 opposite last page.

Lubricated plug valve acts as bottom valve on this 3000-gal. solvent-recovery tank. Tight shut-off of valve prevents leakage which would constitute fire hazard



## Lubricated plug valves shut off safety hazards

**Problem:** Majority of valves, for process lines in proposed Gantrisan® (sulfisoxazole) plant of Hoffmann-La Roche in Nutley, New Jersey, had to be leak-proof, non-sticking, and easily operable.

These conditions were imposed by safety considerations, in handling caustic soda and flammable solvents.

Other considerations were valves' functions of accurately directing metered flows and being subjected to high rate of operations per day.

Examples: Bottom valves on 6000-gal solvent-recovery kettle and those used in auxiliary venting on condensation kettles. Leakage from bottom valves onto floor and into sewer would constitute fire hazard. Should venting valves fail to close completely after closing, flammable solvents would escape to atmosphere during reaction.

Liquid caustic soda was to be pumped from one storage

tank to separating tanks throughout plant. Valves in manifold would be necessary to direct metered flow to various tanks. Sticking of valves would hamper operations. Also, leakage of caustic soda would endanger personnel.

Many valves were to be operated 20 to 30 times per day. This made ease of operation another important factor.

**Solution:** Several hundred stainless-steel lubricated plug valves were installed on 80% of process lines in plant. Tapered plug of each valve works by rotation only.

Lubricated shoulder-type gland joint is incorporated. Gland combines functions of stem seal and thrust bearing. Sealing member is thin, flexible metal diaphragm.

As valve is turned, lubricated surface at top of plug slides freely against metal diaphragm. Two-way leakage protection emanates from lubricated close fit between two





**PLANT ENGINEERING  
MAINTENANCE & SAFETY**

... electrical & mechanical developments

... in providing leak-proof service on process lines handling caustic soda and flammable solvents in sulfoxasole (Gantrisan®) plant of Hoffmann-LaRoche

parts and relatively narrow contact area, through which plug-sealing thrust is applied.

Pressure lubrication of valve provides "jacking" action, seals valve, and reduces friction and wear. Lubrication pressure against smaller end of plug permits easy unseating. Also, lubricant acts to seal valve against leakage while in closed position.

Results: For 20 months the lubricated plug valves have

proved completely leak-proof and provided non-sticking operation. No maintenance other than normal lubrication has been necessary.

Tight shut-off characteristic of bottom valves has reduced possibility of solvent-recovery kettle becoming fire hazard. Venting valves allow fumes to go into atmosphere from condensation kettles without danger.

On caustic soda lines, tight

A manifold of lubricated plug valves controls flow of caustic soda from storage tanks to separating tanks throughout sulfoxasole plant. Non-sticking valves are easily operable due to positive-indicating one-quarter turn on-off operation



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DO IT  
YOURSELF  
in minutes...**



**with the ALLPAX Gasket Cutter**



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The Allpax Gasket Cutter uses the "ironing principle" to hold material flat during the sweep of the cut, and prevents buckling and tearing common with make-shift devices. All materials in general use as gaskets may be cut to diameters ranging from 1/4" to 36" using the popular No. 3 kit. Other kits available for maximum diameters of 12, 24, 48 and 60 inches. Allpax Gasket Cutters and accessory tools are neatly packaged in the permanent metal tool case shown above. An 18" square cutting board is supplied with each kit.



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CANADIAN DISTRIBUTORS: Albion Asbestos Packings Ltd., Montreal 18, Quebec

Check 1971 opposite last page.



## HERE'S THE MOST COMPLETE NOZZLE CATALOG EVER PUBLISHED

Whatever your nozzle problem, look first in this new catalog by Spraco. Here is complete information on a wide range of nozzle types and sizes as well as general spraying coverage data.

Send for your **FREE** copy today . . .

**SPRAY**  
Engineering Company

105 Cambridge Street, Burlington, Mass.

Check 1972 opposite last page.



## One man does it all with MORSE Barrel-Lift

All five drum handling operations—raising, transporting, rotating, tilting and draining—are a one-man job with Morse Barrel-Lift. Keeps 55-gallon steel drums under full control. You save on spilling, overflowing, leakage, damage to drums and accidents. All steel welded construction.



Model 80

## Won't tip, Won't spill, Won't leak Move your drums the MORSE Drum-Karrier way

The Morse Drum-Karrier Model 85 fits all standard drums, permits one-man operation, is instantly removable from hoist hook. Positive tilt lock holds drum in position. Welded, all-steel construction; accommodates standard double chine steel drums 23" diameter, 36" height.

You Can Move It Better  
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Model 85



**MORSE**  
MANUFACTURING CO., INC.

757 West Manlius Street, East Syracuse, N. Y.

Check 1973 opposite last page.

## ENGINEERING & SAFETY

shut-off of valves protects personnel. Compact structure and adaptability to manifold-ing has permitted setting-up of single manifold to direct entire flow of caustic soda from storage tank. No sticking of valves has occurred to impair efficiency of metered flow. Switching from one line to another is simplified, due to one-quarter-turn positive-indicating on-off operation.

(Lubricated plug valves are product of Nordstrom Valve Division, Rockwell Manufacturing Company, 411 N. Lexington Ave., Pittsburgh 8, Pa.)

Check 1974 opposite last page.

## One-hand operation for extinguishers

**Uses:** Dry-chemical fire extinguishing.

**Features:** Extinguishers have one-hand operation, indicating gages in color and interchangeable heads.

**Description:** Hand-portable dry-chemical fire extinguishers are based on stored-pressure principle. Extinguishing agent is expelled by a propellant gas and can be put into action quickly. Units are available in 10-, 20- and 30-lb dry-chemical capacities.

(Sentry energized extinguishers are product of Ansul Chemical Co., Marinette, Wis.)

Check 1975 opposite last page.

## WANTED:

### To Keep You Alive

Almost everyone knows of some tricky unexpected danger situation in his plant. CHEMICAL PROCESSING feels that the dissemination of such information to readers is important. Therefore a monthly series on Chemical Boobytraps is now appearing in this section. If you know of any such situation, please forward an account of it to:

Safety Editor  
CHEMICAL PROCESSING  
111 E. Delaware Place  
Chicago 11, Illinois

**NEW! Sethco corrosion proof**

## SUMP PUMP AND FILTER

handles all acid, alkaline solutions and solvents up to 250°

Self-priming, leakproof Epoxy sump pump provides continuous duty performance. Bracketed inside the tank, it requires no floor space. Outside bracket supports High Temp. Lucite or Epoxy filter chamber . . . resistant to all corrosive solutions and solvents. ½ or ¾ HP motor. Pump and filter chambers are available separately.

**MODEL UAL-20**  
200-300 Gals./Hr.

Complete details on Sethco Specification Sheet No. 751

WRITE for NEW illustrated 8 Page Brochure . . . complete line of SETHCO FILTER PUMP UNITS (50 to 2700 Gals./Hr) providing Depth Filtration for all chemical applications. Includes special informative 'Filter Pump Selection Guide'

**Sethco**

MAYfair 3-4220

2287 BABYLON TURNPIKE, MERRICK, L. I., NEW YORK

Check 1976 opposite last page.

## King MANOMETERS

### For Plant and Laboratory

King Manometers are rugged, low-cost instruments of unexcelled accuracy for measuring pressure, vacuum, differential pressure, and pressure-related phenomena. They're available in the following types, in a complete range of sizes:

#### U-Type Manometers

- Single Cleanout
- With 3-Valve
- Double Cleanout
- Manifold
- Inverted U-Type

#### Well-Type Manometers

- Low-Well
- Barometric-Reading
- Raised-Well
- Flowmeter Type
- Adjustable-Well
- Inclined-Tube

#### Multi-Tube Manometers

- Individual-Well
- Common-Well
- Photo-Manometers

**NEW CATALOG 2008** gives details on these and other models — includes manometer liquids and accessories — explains basic principles. Write —



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REPRESENTATIVES IN PRINCIPAL CITIES

Check 1977 opposite last page.

CHEMICAL PROCESSING

## Chemical Boobytraps

Unsuspected hazards awaiting the unwary

### Steam-condensate leak may cause fires in refineries

In petroleum refining, numerous fires and tank ruptures have occurred when heavy residual material (that portion remaining after gasoline and oil fractions have been removed from crude oil) boils over, due to presence of water in tanks.

Because of heavy and viscous nature of material, any steam formed cannot readily escape from tarry mass. Hence, a boilover is an all too frequent occurrence (example: costly fire at Signal Hill, California, last year).

One major offender, in introducing moisture in residuum tanks, is steam coil used to keep residuum heated and fluid enough to be pumped out. It has been found that threaded connections in such coils often leak steam condensate into tank. With pumping in of more hot residuum, boilover will result. Two methods of ending such leakage of steam condensate:

- 1) Back-weld all threaded connections in steam coils inside tank.
- 2) On larger coils, use flanged, rather than threaded, connections.

(Contributed by N. F. McNaughton, Process Engineer, DX Sunray Oil Company, Duncan, Okla.)

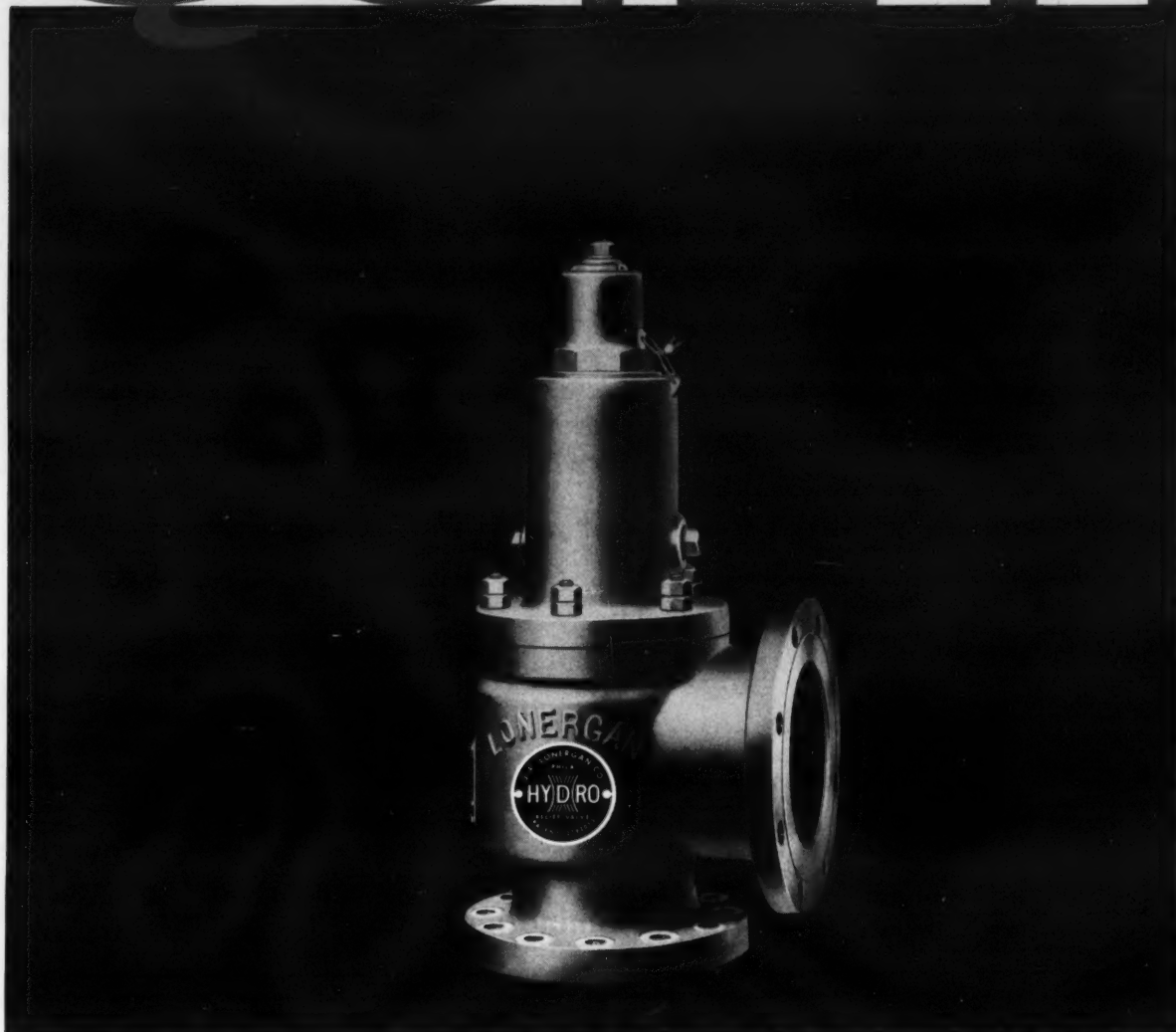
**Cyanuric chloride** handling, storage and first aid procedures are topics covered in *Cyanuric Chloride Bul*—Nilok Chemicals, Inc., 2000 College Ave., Niagara Falls, New York.

Check 1978 opposite last page.

**Fiberglass roof exhausters** are clarified in *single-sheet Fiberglass Roof Exhauster Bul*—The Galaher Company, 4108 Dodge, Omaha, Nebraska.

Check 1979 opposite last page.

# QUIET!



## New Lonergan liquid relief valve doesn't chatter; eliminates product waste; reduces maintenance

Ever hear a relief valve chatter? They all do! They shout their faults to the world, while beating themselves to death. When you can hear one, you know product is being wasted; maintenance costs are increasing; employees are growing annoyed; and perhaps dangerous, flammable liquids are running loose.

Now you can install a Lonergan Hydro-Valve guaranteed not to chatter, hammer, or drum, *yet still deliver full rated capacity!* Gone is the need to install an oversized valve or a high-priced, heavy-weight regulator valve to eliminate chatter on by-pass and emergency relief applications.

The Lonergan Hydro-Valve does not contain any capacity-reducing gimmicks or gadgets to eliminate chatter. Instead, it is designed to be completely quiet under all operating conditions. It proves itself so on hundreds of applications every day.

Bellows models of the Lonergan Hydro-Valve are also available for corrosive applications. The elimination of chatter and its associated bellows flexing action, greatly extends bellows life and virtually ends the need for expensive bellows replacement. *Full details are in a Hydro-Valve bulletin. Write for a copy today!*

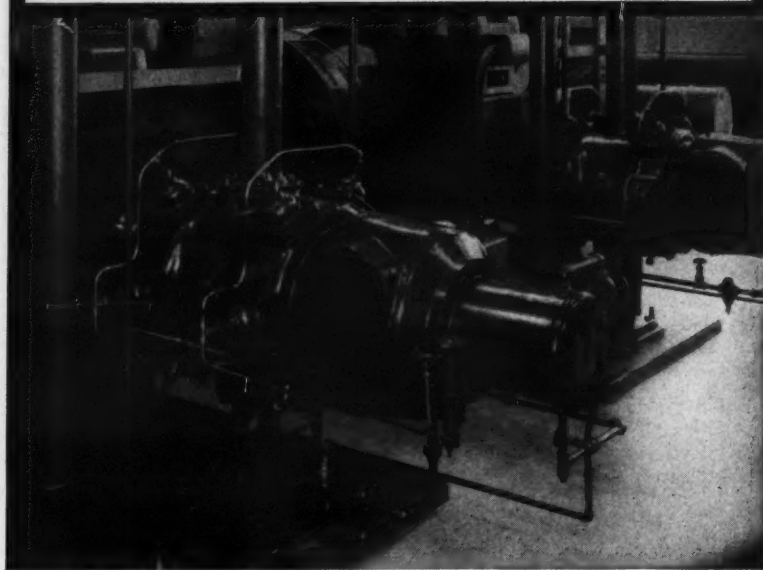
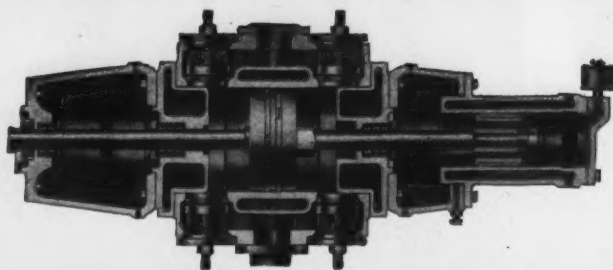
## Lonergan

J. E. LONERGAN CO. • 203 RACE STREET • PHILADELPHIA, PA. • SINCE 1872



Check 1980 opposite last page.





**\*with PENNSYLVANIA tailrod construction,  
COMPRESSORS PROVIDE GUARANTEED  
OIL-FREE AIR...eliminate contamination**

If your processes stand the chance of being ruined by the least contamination, better look into Pennsylvania Oilfree Compressors today. They are built specifically to eliminate any lubricant or oily vapor which would interfere with delicate instruments, contaminate food and beverages or be incompatible with chemical processes.

\*Pennsylvania Oilfree construction is one reason that we can guarantee oil-free compressed air or gas. An extra long distance piece between compressing cylinder and main frame assures that no part of the piston rod which enters the lubricated frame will alternately enter cylinder stuffing box. Result: a compressor with isolated cylinder which will deliver air or gas guaranteed entirely free of oil or oily vapors due to lubricants. Pennsylvania tailrod construction produces a full floating piston which prolongs the life of carbon piston rings and eliminates the danger of piston riding against cylinder walls.

Get full details on Pennsylvania 3-ATC Compressors. Send for free copy of Bulletin 351, today.

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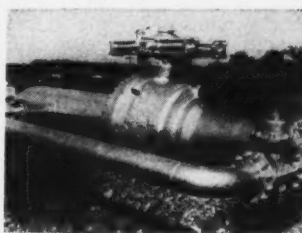
**ENGINEERING & SAFETY**

**Only two moving parts  
in spherical valves**

**Uses:** Particular application in gas, crude-oil and product pipelines.

**Features:** Valves have four main parts — operating stem, ball plug, two spherical ring seats and body housing. Of these, operating stem and ball plug are only moving parts.

**Description:** Spherical-type valves are constructed of carbon steel. Since they do not operate by wedge action, there



Carbon-steel spherical-type valves have four-part construction

is no single pressure side to restrict valve to one-way flow.

Valves are constructed on rotary principle. Spherical plugs and ring seats are full-floating and adjust automatically. They are available in 16, 20, 24 and 30" sizes. Pressure ratings are ASA 400 and 600 lb and 1000- and 1250-lb WOG.

(Hypresphere valves are product of Metering and Valve Division, Rockwell Manufacturing Company, 400 N. Lexington Avenue, Pittsburgh 8, Pennsylvania.)

Check 1982 opposite last page.

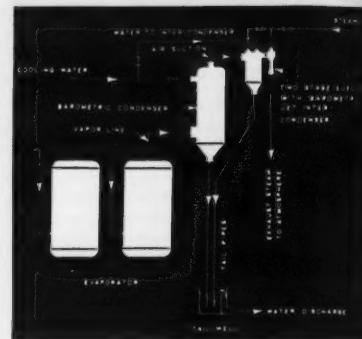
**Easily installed sleeve  
protects hose to 200°F**

**Uses:** Protection of hose.

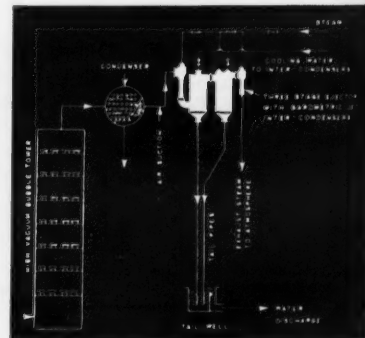
**Features:** Sleeve will retain shape and flexibility under temperature conditions of -20 to +200°F. In installation, sleeve is cut to length with hacksaw or manufacturers' machine. It is then wound on to hose.

**Description:** Plastic-coil sleeve can provide protection for hose of 1/4 to 2" diameter. Sleeve for hoses to 5/8" diam is supplied in coils to 50' in

*Here's how to get  
high vacuum  
at lower cost... from  
**C. H. WHEELER***



**In Evaporation,** C.H. Wheeler Tubejet® Ejector works with Wheeler Barometric Condenser in flow diagram above to produce high vacuum. Initial cost of Ejector is low and installation is easy because of light weight and simple connections.



**In Refining Operations,** diagram above shows how to create high vacuum in bubble tower. Three-stage Tubejet Ejector draws off exceptionally large volumes of gases, vapors. Absence of moving parts and use of corrosion-resistant materials (stainless steel, bronze, cast iron) result in very low maintenance costs. Many Tubejets, in fact, have operated more than 35 years without major replacement of parts!

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Steam Jet Vacuum Equipment • Centrifugal, Acid and Mixed Flow Pumps  
Steam Condensers • Marine Auxiliary Machinery • Nuclear System Components

Check 1983 opposite last page.

**CHEMICAL PROCESSING**

## ENGINEERING & SAFETY

length. For larger size hose, 25' lengths are supplied. Sleeve is reportedly unaffected by air, water, oil, gasoline and most other fluids, including hydraulic oils.

(Plastic-coil sleeve is product of Aeroquip Corporation, Jackson, Mich.)

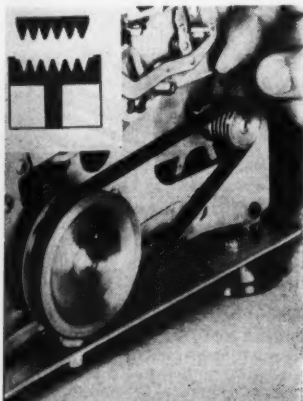
Check 1984 opposite last page.

### Thin multiple-V belts for 0.8" pitch diam

**Uses:** High-speed small-pulley power-transmission applications.

**Features:** Thin flexible belts will operate over sheaves as small as 0.8" pitch diam.

**Description:** Endless, rubber multiple-V belts have parallel V-ribs running lengthwise around inside circumference.



Thin flexible belts will operate over sheaves as small as 0.8" pitch diam

Each combines one-piece construction of flat belt with high grip and positive sheave-groove tracking of multiple-V belts.

Synthetic fibers running through pitch line provides strength. Sheaves are designed to mate fully with belt ribs. This distributes load equally over entire width of drive. Also, it prevents belt from sinking into grooves. Pitch length range is 8 to 98".

(Poly-V "J" belts are product of Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N. J.)

Check 1985 opposite last page.

## INDUSTRIAL at WORK ...on quality control



### How STAUFFER CHEMICAL modernization pays off in improved sulphur quality

Improved sulphur quality and an increase in purification production were Stauffer Chemical's aims in a recent modernization program at their Chester, Pennsylvania operation.

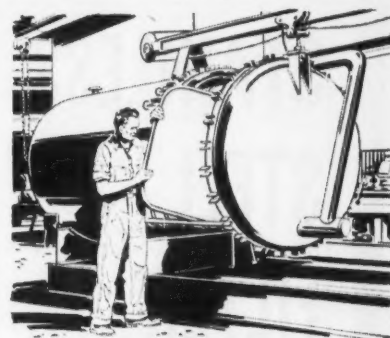
Playing an important role in these now realized goals was this type 122 Industrial horizontal filter. Here's how it helped Stauffer to:

**IMPROVE QUALITY.** Hand skimming of settled carbon from open troughs has been eliminated, permitting major improvements in quality control and optimum carbon removal through filter.

**SPEED PURIFICATION.** The Industrial filter is designed to handle both ash and carbon in one automatic operation. Raw sulphur is melted, purified and then pumped directly to processing.

In addition, the Industrial filter operation occupies *less* space because with settling eliminated—so is their need for tertiary tanks.

The Stauffer modernization story is typical of how quality-conscious processors throughout industry are turning to Industrial-engineered systems to help meet their customer requirements for more, but *better*, products . . . through controlled filtration.



Industrial's "lift out" leaves speed screen replacement and give easy access for filter maintenance. At Stauffer Chemical Company, extra-heavy bolted leaf construction and hydraulic leaf extractor automate operation.

WRITE FOR  
BULLETIN 122



**INDUSTRIAL FILTER & PUMP MFG. CO.**  
5908 Ogden Avenue, Cicero 50, Illinois

**INDUSTRIAL**

See Industrial Booths 1188-1202 — New York Chemical Exposition

Check 1986 opposite last page.

# FOR TOUGH FILTERING

## Use

## NEWARK STAINLESS STEEL FILTER CLOTH

**NEWARK**  
for **ACCURACY**

- CORROSION RESISTANT
- NON-CONTAMINATING
- RUST PROOF
- EASY TO CLEAN
- FREE, EASY FILTRATE DISCHARGE
- EXCEPTIONALLY LONG SERVICE LIFE

Check these operating advantages found in Newark Stainless Steel Filter Cloth. They may suggest the solution to one of your special filtering problems or they may be the answer to your need for a backing cloth that will really stand up through tough, corrosive filtering cycles.

Newark Stainless Steel Filter Cloth is easily adapted to practically all types of filters and is available in a wide variety of weaves. When writing please give us details on your process.

## Newark Wire Cloth COMPANY

351 VERONA AVENUE • NEWARK 4, NEW JERSEY

Check 1987 opposite last page.

### ENGINEERING & SAFETY

#### *Straight-through flow with control valve*

**Uses:** Control-valve applications.

**Features:** Flow through valves moves in straight path at all orifice settings. This results in low pressure drop and friction loss with infinitely variable throttling. K factor of valve is 0.35.

**Description:** Flow regulation is accomplished by raising or lowering stem which is placed at selected angle to the flow. Stem has 90° milled groove in tip. Apex of groove is parallel to direction of flow. Stem does not rotate, but moves up or down in an angle.

As stem rises, larger section of V-groove is presented as flow area. Flow passes through groove parallel to apex. In this manner, flow does not deviate from straight line at any point in its path. This causes almost zero fluid friction and zero turbulence.

Valves are made in carbon steel, stainless steel and bronze. Pressure ratings are 600 to 10,000 psi. Sizes available are 1/8 to 4". Automatic control can be provided in either diaphragm or cylinder actuator.

(Straight-flow control valve is product of General American Valve Co., Box 444, Corona del Mar, Calif.)

Check 1988 opposite last page.

#### *Violent cover openings do not threaten closure crews*

**Uses:** Scraper traps for gas, crude or products line; meter-run inspection doors and meter provers; compressor-station blow downs; and other applications.

**Features:** Closure, in 8" sizes and larger, cannot be opened if high pressure is present. This eliminates danger of injury to crews by violent opening of covers under pressure. As yoke of closure is backed off, it continues to hold cover firmly until seal is broken and pressure remaining is relieved.

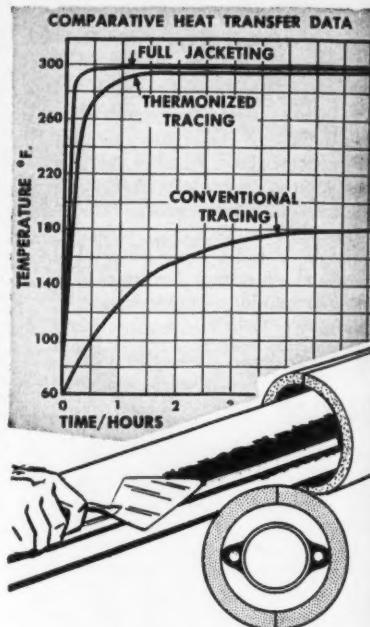
**Description:** One man hinged

## HAVE YOU TRIED



### Thoroughly proved HEAT TRANSFER CEMENT

now effecting savings up to  
90% for over 1,000 users!



Thermon is a non-metallic adhesive compound with highly efficient heat transfer properties, and is easily applied over either steam traced or electrical resistance systems . . . working equally well for either heating or cooling processes.

Thermonizing has excellent heat transfer characteristics (see curves), exceeding steam traced equipment approximately 1100%, and closely approaching jacketing equipment. Thermon can be used almost without exception in place of expensive jacketing (and in many applications where jacketing is impossible), with savings up to 90%.

Write for the new Thermon  
Engineering Data Book 502.

See our Exhibit  
Booth 1207  
27th Exposition of  
Chemical Industries  
Coliseum, New York  
Nov. 30 to Dec. 4, 1959



**THERMON  
MANUFACTURING CO.**

1017 Rosine • P. O. Box 1961  
Houston, Texas

Check 1989 opposite last page.

CHEMICAL PROCESSING



closure is complete assembly. It consists basically of hub that is installed with single circumferential weld and hinged cover or cap that is readily clamped within two yoke halves. Hinge is integral part of every closure.

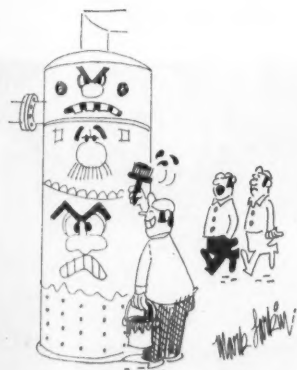
Closures are being produced in sizes of 2 to 42" for ASA 150-, 300- and 600-lb service. Larger sizes and other pres-



One-man hinged closure is mounted here on vertical strainer pot

sure classes are available on special order. Counterbalanced spring-loaded types are offered for vertical applications in 18 to 36" sizes for ASA 150-lb service.

(One-man hinged closures are product of Tube Turns, Division of Chemetron Corporation, Box 43, Louisville 1, Ky.) Check 1990 opposite last page.



"... Met the new man from Alaska?"

# TWO Fisted Performance

In pumping chemicals, maximum service satisfaction is dependent on *two* factors. Design and construction quality constitute one factor; the other is the accuracy of the foundry in meeting metallurgical specifications for corrosion resistance.

Because LaBour pumps embody such important and exclusive features of design it is perhaps easy to overlook the fact that LaBour foundries employ equipment and techniques second to none for precise control of alloy composition and grain structure.

That's why, when you buy LaBour, you get *two*-fisted performance assurance. Top ability to resist corrosion and top ability to move liquids economically and dependably are combined in these pumps. Ask for Bulletin B-1b.

**REGULAR PRODUCTION IN LaBOUR FOUNDRIES INCLUDES THESE ALLOYS:**

- Electric Furnace Cast Iron
- Bronze
- Lead
- Aluminum
- R-55 (Chrome-Nickel)
- Y-17 (Chrome-Nickel-Molybdenum)
- Y-30 (Nickel-Molybdenum)
- 149 Stainless Steel
- 304 Stainless Steel
- 316 Stainless Steel
- Elcomet K (High Nickel Stainless)

ORIGINAL MANUFACTURERS OF THE SELF PRIMING CENTRIFUGAL PUMP

# LaBOUR

THE LaBOUR COMPANY, INC. • ELKHART, INDIANA, U. S. A.



Check 1991 opposite last page.

**Moisture-liquid indication  
without gaskets, springs  
eliminates leakage**

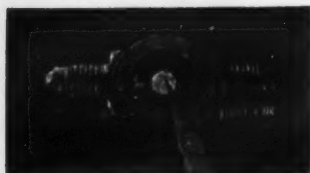
Fused sight glass utilized  
for observation

**Uses:** Moisture-liquid indi-  
cation.

**Features:** Fused sight glass  
eliminates leakage danger by  
doing away with gaskets and  
springs.

**Description:** Moisture-sen-  
sitive element of indicator  
turns blue when refrigerant is  
dry and pink when moisture  
is present.

Units are available for lines  
of  $\frac{1}{4}$  to  $2\frac{1}{2}$ " OD. Sizes above  
 $\frac{7}{8}$ " have polished all-copper  
body. All-brass body is used



Detector unit of moisture-liquid  
indicator turns blue when re-  
frigerant is dry and pink when  
moisture is present

for smaller sizes. This permits  
most minute bubbles or slight-  
est change in color of moisture  
indicator to be readily de-  
tected.

(Moisture-liquid indicators  
are product of Remco, Inc.,  
Zelienople, Pa.)

Check 1992 opposite last page.

**Component proportioning  
in entire cycle  
is accurate**

Three streams are controlled  
with sharp cut-off

**Uses:** Valving, mixing and  
dispensing polyurethane  
foams.

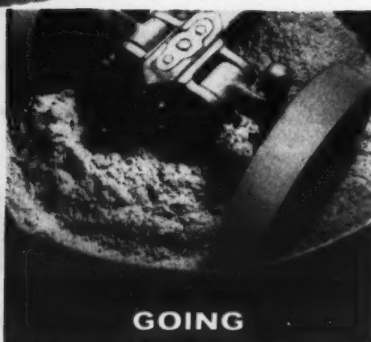
**Features:** Accurate pro-  
portioning of components  
throughout entire foaming cy-  
cle.

**Description:** In mixing head,  
rod-type valve, having Teflon  
seals, controls two or three  
material streams with sharp  
cut-off for ON-OFF opera-  
tion. Unit is designed for con-  
tinuous recirculation of chem-

# At the New York Chemical



GOING



GOING



GONE

# Show...

## TAKE A YARDSTICK TO CONTROLLED DISPERSION

In this era of expensive high purity, high uniformity materials, it takes a lot of mixer to lay claim to cost reductions. A machine that can help eliminate reprocessing and remixing, slash waste and rejects by the simple expedient of making the most of prepared ingredients, can turn problem mixing operations into profit opportunities.

*You don't believe it! It's well that you shouldn't. Because no mixer can be all things to all processes. That's why we say only this of the Simpson Mix-Muller: If you mix dry or semi-dry solid materials, yours is a process that suffers most from wasteful blending practice . . . but, it is also a process that can profit most from controlled dispersion.*

We would like to take the face-to-face opportunity to show you *why* at the Chemical Show. Why not come in? Tell us you're from Missouri! And *take a yardstick to controlled dispersion.*

*Write for the new Handbook on Mulling.*

**SIMPSON MIX-MULLER® DIVISION**  
NATIONAL ENGINEERING COMPANY  
640 Machinery Hall Building • Chicago, Illinois

**SEE MULLING DEMONSTRATED!**

Booth 695,  
New York 27th Exposition  
of Chemical Industries,  
Nov. 30 to Dec. 4

**NEW...**

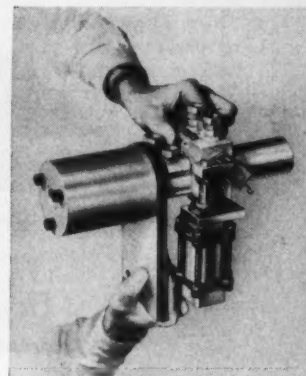
**SEE NATIONAL  
CONVEYOR  
SYSTEM  
IN OPERATION**

Check 1993 opposite last page.

### ENGINEERING & SAFETY

ical components when mixing is not taking place. This permits pressure balance of mix, recirculate cycles.

Mixing chamber is self-cleaning for production-line molding applications. Chamber is furnished with extra



Mixing chamber of head is self-cleaning for production-line molding applications

port, which can be used for solvent flushing or air control in special applications.

Head produces foams of rigid, semi-rigid and flexible types. It uses formulations of polyesters, polyethers or castor oils, with throughputs up to 50 lb/min.

(Standard model mixing head is product of The Martin Sweets Company Inc., 114 S. First St., Louisville 2, Ky.)

Check 1994 opposite last page.

Globe, angle valves, which incorporate Teflon V-ring pressure seals, are specified in TA Valve Literature — Dept. 23-K, The Bastian-Blessing Company, 4201 Peterson Ave., Chicago 46, Ill.

Check 1995 opposite last page.

Heat-storage materials and systems are being investigated by Battelle Memorial Institute and Comstock and Wescott Inc., for the Joint Heat Pump Committee of the Association of Edison Illuminating Companies and Edison Electric Institute. A reprint of an article, reporting the results of preliminary investigations in this area, is now available. Heat Storage Research Paper—Joint AEIC-EEI Heat Pump Committee, Sixteenth Floor, 750 Third Ave., New York 17, New York.

Check 1996 opposite last page.



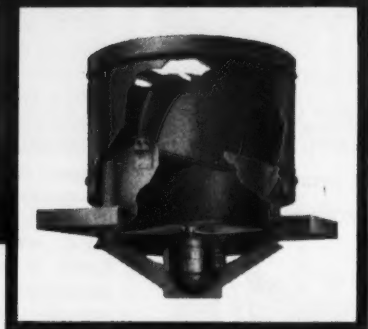


**PROPELLAIR®**

Ventilating  
Equipment



Cutaway shows  
design features of  
the Sky-Blast

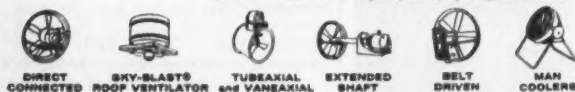


## Free-Flow SKY-BLAST® Roof Ventilators are WEATHERPROOF!

Even if the rain comes down in buckets, there's no need for weather covers on SKY-BLAST roof ventilators. In operation, the powerful airstream keeps out snow, rain and sleet. At rest, butterfly dampers form a water-tight seal, won't leak a drop. With no interfering covers, more air is moved at less cost. Fumes are thrown high in the air to prevent re-entry into the building and to eliminate roof maintenance problems created by other types of ventilators. Wind velocity or direction can't affect performance. Heavy gage steel surfaces are hot-dip galvanized for real sou'wester protection. With patented, non-clogging rainshed, low wind guard, rugged base and condensate drain, it's always fair weather beneath a SKY-BLAST. Wind tunnel proven ratings to 78,000 cfm. Send for bulletin 680—CP

**PROPELLAIR®**

Div. of Robbins & Myers, Inc., Springfield, Ohio



**MOVING AIR IS OUR BUSINESS®**

Check 1997 opposite last page.

**PLANT ENGINEERING  
MAINTENANCE & SAFETY**

## STATIC SWITCHING DEVICE

**AC switch with no moving parts can continuously modulate almost any amount of current without wear, disintegration or loss of efficiency**

**USES:** Units are adaptable to perform wide range of high-power AC-control functions. Models have been developed and applied in laboratory tests for functional use as proximity switches, logic devices, modulators, circuit breakers, error detectors, amplifiers, regulators and time delays.

**Features:** Control units incorporate no moving parts. There is no wear or disintegration of electrodes or grid elements. Depletion of electrolytic composition does not occur.

Devices are unaffected by vibration, shock, impact, moisture or position. Operation is not dependent upon sensitivity to temperature or influenced by heat-response deviation characteristics.

**Description:** Static switching device consists of two AC-connected electrodes and a grid control element. All three are immersed in electrolytic bath, permanently sealed within encapsulated container.

Representative unit is 2" long and 1 3/4" in diam. It handles about 300 w. Units are in ratings of 3 to 70v AC. Ratio of control to load current can be varied from 10:1 to 50:1 or higher, depending on application requirements. During tests, break response has been controlled between 1/2 to 3 cy (60 cy AC).

### Surface-impedance Control

Small DC potential is applied to permanently sealed cell through grid control element. In this manner, non-conducting surface films of two load-connected electrodes are instantaneously changed from non-conductive or semi-conductive to

conductive state.

Resulting high amperage is controlled entirely by small energy stimulus, so as to permit either switching or modulation of load current to take place.

When small grid signal is removed from control circuit (or when second signal of opposite polarity is applied), conductive surfaces of load-connected electrodes are automatically restored to original non-conductive state.

Both load-carrying electrodes are coated with oxide film. They act in circuit much the same as back-to-back rectifiers, preventing current from flowing through to load. Application of small DC potential to grid control element polarizes two electrodes. Metal ions are thus forced into structure of oxide film. This changes film from non-conductive to conductive state.

### Dual-purpose Electrolyte

Electrolyte has double function: 1) To bridge two load-connected electrodes and conduct current flow between them when surfaces are in conductive state and 2) to provide convenient, instantaneous means for polarizing two electrodes from grid element.

No change in state of electrolytic medium occurs during conduction. Electrolyte neither has any transducing characteristics of its own, nor is based in any way upon solion principles.

(Electro-ionic surface-impedance controls are product of Ovitron Corporation, 14830 Schaefer Hwy., Detroit 27, Mich.) Check 1998 opposite last page.

CHEMICAL PROCESSING

# How American Brake Shoe Maximates Production

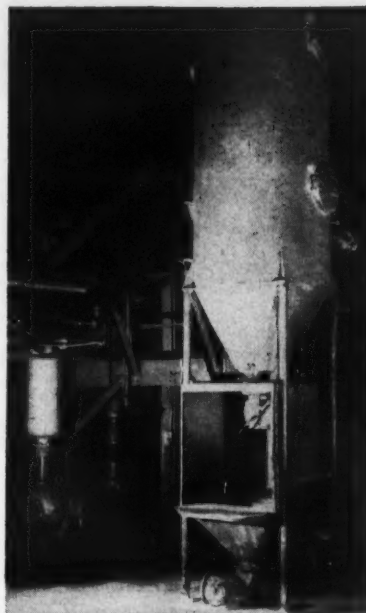
When the American Brake Shoe Company began an extensive modernization program at its New Castle, Delaware plant, one of the first steps management took to maximize production—that is achieve maximum output at less cost—was to install a Hoffman pneumatic conveying system for keeping bentonite, dextrin, silica flour and other materials *on the flow*. With a Hoffman exhauster furnishing the air as well as suction for the handling system, and use of components described here, the equipment not only simplified bulk conveying chores but paid its way in a few months by providing substantial production, material and labor savings.

## MATERIAL INTAKE VALVE

Materials are introduced into the air stream through a unique non-clogging intake valve attached to the bottom of a hopper and flow smoothly through pipe lines to any one of six primary cyclone storage tanks more than 350' distant. Hoffman intake valves insure the uninterrupted flow of dry, powdery or granular materials through all types of vacuum conveying systems. Suitable for use with 2" through 6" pipe-lines, they are equipped with standard 8" flanges and can be easily attached to bins, hoppers, or dust collectors. Connected equipment is protected from exposure to the full suction of the system by a separate air inlet. The material handling rate can be adjusted while air is flowing. Thorough mixing insures smooth transit.

## HINGE VALVE

Self-cleaning Hoffman hinge-type discharge valves are designed for air-tight closure against a head of material. The one-piece valve body is cast of gray iron with its rubber-faced disc and seat completely inside



A portion of the Hoffco-Veyor system installed at the American Brake Shoe Co. plant in New Castle, Delaware.

the casing. Lever linkage permits operation by means of chain or cable from a remote station. Provision can also be made for air or hydraulic cylinder actuation of the valve.

## ROTARY VALVE

Chain driven rotary discharge valves of cast semi-steel construction feed the material in controlled quantities. Designed for interchangeability of various types of fabricated and cast rotors, valves are equipped with torque limiting drive sprockets for protection against jamming and overloading. Equalizing connections permit attachment of bleed lines to vacuum or pressure source. Inspection of the interior can be made through an access port without disassembly of the valve.

## PERISTALTIC VALVE

Controlled expansion and contraction of rubber diaphragms permit discharge in measured quantities. Since there are no internal moving parts, even coarse abrasives can be handled with minimum wear. Sheet rubber diaphragms are easily replaced whenever necessary.

## COMPETITIVE ADVANTAGES

In handling quantities of dry, free-flowing powdery and granular materials such as sand, shot, chemicals, etc., Hoffco-veyor systems and components speed production—provide many genuine benefits and advantages which are reflected in higher profit margins. These include:

- flexibility
- easy installation
- cleanliness
- material saving
- time saving
- labor saving
- lower initial cost
- pay for themselves

## FREE ENGINEERING SERVICE

If you have a materials handling problem, you can solve it with either a complete Hoffman system or any of its parts which may be purchased separately to fit your needs. Available equipment includes dependable centrifugal blowers/exhausters, cyclones, collectors, material intake, hinge, rotary, butterfly and peristaltic valves as well as filter bag collectors. We'll be glad to make a free engineering survey to determine how you can improve your manufacturing methods by maximizing production with a really tight method of material handling. Send now for a free descriptive booklet. Please write:

Air Appliance Division  
Dept. EM  
U. S. Hoffman Machinery Corp.  
103 Fourth Avenue  
New York 3, New York

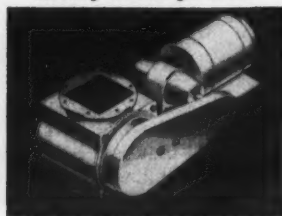
Material intake valve



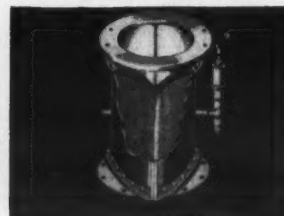
Hinge valve



Rotary discharge valve

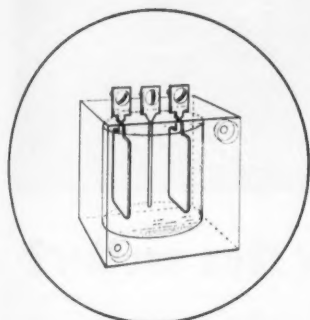


Peristaltic rubber valve

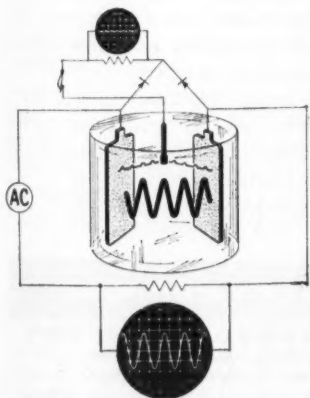


Oscillographic recording of control unit operation. Test conditions:

Supply voltage, v AC	40
Load (resistive), $\Omega$	50
Load current, ma AC	770
Effective unit resistance, $\Omega$	2
Control current, ma DC	32



Control unit consists essentially of two AC-connected electrodes and a grid control element (center). All three are immersed in electrolytic bath, permanently sealed in encapsulated container

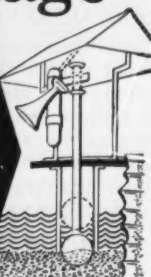


Schematic diagram is for ON condition. Self-energized method of excitation is achieved through use of two diodes. These block AC to grid control circuit and allow application of pulsating DC potential of proper polarity upon grid- and load-connected electrodes. Variable resistor can be used instead of switch. In this way magnitude and potential of control signals can be regulated to achieve modulation of load circuit

Check 1999 opposite last page.

## prevent HAZARDOUS spillage

and  
avoid  
waste  
with  
**Falcon**  
AUTOMATIC  
LIQUID  
LEVEL  
ALARM



"Blue Chip" petroleum and chemical firms now are installing this unit to prevent wasteful, always expensive and often dangerous tank overflow in refineries, plants, bulk stations, transportation and other liquid-handling operations.

Falcon Liquid Level Alarms are—

• Non-Electric • Non-Pneumatic • Self-Contained • Inexpensive • Audible Up to ½-Mile or More • Easily installed on Existing Equipment

## save your voice



with the

## Falcon Chief

and save money, too!

speak as you normally would—  
be clearly heard and under-  
stood up to ½-mile away!

Unique transistorized power megaphone—an instrument you will be proud to own. Gives up to 6,000 two-second amplified messages from standard replaceable battery. Light (3¼ lbs.)—easy to handle and use. Attractive red and gray polyethylene—built for abuse. Attractively priced for you, too!

To: **Falcon** ALARM CO., INC.  
Summit, N. J. Dept. CPE

Kindly furnish complete data about your "Sounds for Safety" products.

We are especially interested in your:

☐ Fire Detectors & ☐ Power Megaphone Systems  
☐ Warning Horns & ☐ Liquid Level Alarms Systems

Name \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_

Check 2000 opposite last page.

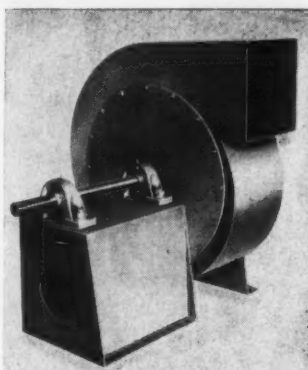
## ENGINEERING & SAFETY

**Shock loss minimized  
by design of blades  
in centrifugal fans**

Temperatures up to 250°F  
are withstood

**Uses:** Ventilating and material-handling applications.

**Features:** Design of blade permits wheel of unit to intercept air flowing into fan with angular scoop-type action



Radial-blade centrifugal fans are rated to 60,535 cfm

which minimizes shock loss. Unit can be applied at temperatures to 250°F.

**Description:** Radial-blade centrifugal fans have wheel-size range of 14 to 71¼" diam. Performance is rated to 60,535 cfm.

(RF industrial fans are product of Garden City Fan Co., 801 N. Eighth St., Niles, Mich.)

Check 2001 opposite last page.

**Long-half-life emitters  
are identified  
immediately**

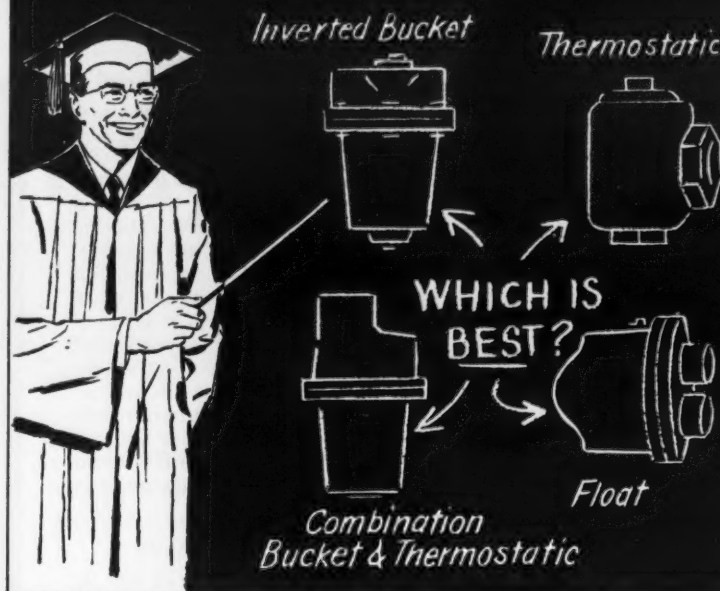
Beta-gamma-to-alpha ratio  
is system key

**Uses:** Identification of long-half-life emitters.

**Features:** System is reported to be first to permit immediate identification of long-half-life emitters.

**Description:** Air-monitoring system operates on principle that ratio of beta-gamma-to-alpha activity in natural radon-thoron progeny is essentially constant. Thus any radioactivity, other than nor-

## STEAM TRAP CHALK TALK #3



## Is one trap design better than another?

- The steam trap user is often confused by the fact that there are four different designs of traps on the market. Is one better than another, and if so, which one should he use?

Actually, each design of trap has its place, *depending upon the application*. For example, thermostatic traps are preferred for chemical, petroleum and other outdoor applications because they cannot freeze. However, they do not compare in efficiency with inverted bucket traps for normal inside use. Where fast heating up is required, the combination bucket and thermostatic trap permits steam units to reach maximum heat 2½ times faster. For continuous service, float traps are best.

For sound recommendations, ask Anderson. Manufacturing a complete line of traps, in all designs, they give unbiased counsel. Their engineering catalog, "How to Select Steam Traps and Other Fluid Specialties" contains hundreds of worthwhile recommendations. Mail coupon for your copy today.

## A TRAP FOR EVERY PURPOSE



**THE V. D. ANDERSON COMPANY**  
division of International Basic Economy Corporation  
1948 West 96th Street • Cleveland 2, Ohio

Please send a copy of your new engineering booklet, "How to Select Steam Traps and Other Fluid Specialties".

Name \_\_\_\_\_ Title \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

## ANDERSON SUPER-SILVERTOPS

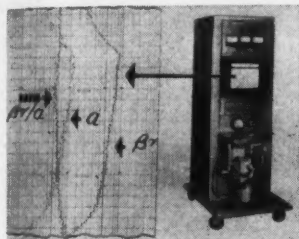
Check 2002 opposite last page.

CHEMICAL PROCESSING



mally present radon-progeny, will disturb ratio level immediately.

System utilizes this radiation phenomenon by providing beta-gamma-to-alpha ratio instantaneously, as collection of airborne particulates takes



Air-monitoring system operates on principle that ratio of beta-gamma-to-alpha activity in natural radon-thoron progeny is essentially constant

place. Single detector accomplishes this by sensing and separating alpha from beta-gamma and measuring their ratio.

Ratio rise indicates presence of long-half-life, predominantly beta activity. Ratio fall indicates presence of long-half-life, predominantly alpha activity. Constant ratio indicates that, except in rare instances, only normal background is being encountered.

System is available in either of two instruments—moving-filter type (AM-33R, shown in photo) and fixed-filter type (AM-22R).

(AM-22R and AM-33R monitoring systems are products of Nuclear Measurements Corp., 2460 N. Arlington Ave., Indianapolis 18, Ind.)

Check 2003 opposite last page.

**Savings** in labor and operating costs through use of continuous boiler blowoff systems are suggested and examples cited in Bul 5700-A—Cochrane Corporation, 17th St. below Allegheny Ave., Philadelphia 32, Pa.

Check 2004 opposite last page.

**Flared (37°) tube fittings** in steel, stainless steel, and brass are outlined in Bul 3077 — The Imperial Brass Mfg. Co., Dept. CPR-119, 6300 W. Howard St., Chicago 48, Illinois.

Check 2005 opposite last page.

# Things You Should know about

# Voegt

## VALVES, FITTINGS, FLANGES & UNIONS

**FORGED STEEL**

**GATE**

**ROUND BOLTED BOW**

**GASKET JOINT**

**Henry Voegt Machine Co., Louisville, Ky.**

Check 2006 opposite last page.



Corrosive wastes are handled in UPVC (unplasticized polyvinyl chloride) piping at the boric acid plant of Stauffer Chemical Company, San Francisco. Equipped with ttp drainage fittings.

## To help you on UPVC piping

We have developed valuable data to help you design for UPVC piping to stop corrosion...available in ttp Catalog 119, free on request. Also gives complete specifications on ttp fittings, flanges, valves and specialties.



**TUBE TURNS PLASTICS, INC.**

DEPT. CP-11, 2929 MAGAZINE STREET  
Louisville 11, Kentucky

Check 2007 opposite last page.

## "TORQUE WRENCH" MANUAL

SENT UPON REQUEST

**PA STURTEVANT CO.**  
ADDISON QUALITY ILLINOIS

Manufacturers of over 85% of the torque wrenches used in industry

Formulas  
Applications  
Engineering Data  
Screw Torque Data  
Adapter Problems  
General Principles

Check 2008 opposite last page.

## ENGINEERING & SAFETY

### Corrugated plastic panels shake-off effects of explosion

Wired glass in same area  
is broken to fragments

Notable exceptions, to damage caused by a recent severe explosion at Hooker Chemical Corporation's Niagara Falls, New York, plant, were corrugated, translucent, fiber-glass-reinforced polyester-resin panels, used for daylighting in several nearby buildings.

The explosion leveled a 50 x 100' single-story concrete-block building. Building had concrete-slab roof and housed several organic-chemical manufacturing processes.

In every instance where they were used nearby, the plastic panels either flexed and sprang back to position or



This is organic-chemical manufacturing building near explosion site, where two fiber-glass-reinforced polyester-resin-based panels (middle and lower left) broke loose from bolts securing them. However, they remained intact without shattering. Others flexed and sprang back to position. In contrast, glass windows were shattered (right middle and top); corrugated asbestos-board roof was broken by flying debris; sheet-metal siding was bowed (lower left); and, just out of picture, wire-reinforced glass was blown out in jagged pieces

else were forced loose from bolts securing them, dropping to ground as intact panels. Danger to personnel, from shatter-proof panels with no sharp cutting edges, was virtually nil.

A good number of plain glass and wire-reinforced glass windows and skylights were shattered and fell in fragments. Glass brick was cracked and blown out in

## New! AIR CONTROL UNITS



Lubri-Air®  
Control Unit

### Automatically

- ★ Filter pressurized air to provide a clean, dry air supply
- ★ Compensate for fluctuations in air pressure
- ★ Compensate for variations in cfm requirements of pneumatic equipment
- ★ Adjust amount of misted lubricant to meet changing cycle rates

619-C

T.M. Registered — Pat. Pending

Write Dept. CP-1159, The Bellows Co.,  
Akron 9, Ohio, for descriptive Bulletin LA-15.

## The Bellows Co.

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

AKRON 9, OHIO

OTHER INDUSTRIAL DIVISIONS OF IBEC: Sinclair-Collins Valve Co.,  
Valvair, Akron, Ohio • V D Anderson Co. Cleveland, Ohio

Check 2009 opposite last page.

## TRY DARCOVA PUMPCUPS

FOR

- Higher pump efficiency
- Lower pump maintenance



Cross-section of the conventional  
and 45° bevel type Pumpcups

IT'S a fact that hundreds of reciprocating pump and cylinder users today are standardizing on Darcova Pumpcups because they eliminate fluid slippage, costly down-time and maintenance!

It's easy to check these claims right in your own plant. Behind this exceptional Darcova Pumpcup performance lies texture-engineering and cup design that conform precisely to pressure-temperature-fluid conditions.

Pumpcups of various types are available in a complete range of sizes and texture-engineered compositions for your reciprocating pump and cylinder requirements.

Why not get all the facts?  
Send today for Pumpcup Bulletin No. 5903.

**DARLING VALVE & MANUFACTURING CO.**  
Williamsport 4, Pa.



TRADE MARK  
**PUMPCUPS**

Check 2010 opposite last page.

CHEMICAL PROCESSING

## ENGINEERING & SAFETY

some instances. Corrugated asbestos-board siding and roofing was broken into pieces.

Damage extended as far as several hundred yards from blast. In many cases, breakage even occurred on sides and skylights of buildings opposite from direction of explosion (due to back pressure).

(Corrugated fiber-glass-reinforced panels were made with Hetron® polyester resin, which is product of Durez Plastics Division, Hooker Chemical Corporation, Box 344, Niagara Falls, N.Y.)

Check 2011 opposite last page.

(Fire-Snuf panels are product of Resolite Corporation, Zelienople, Pa.)

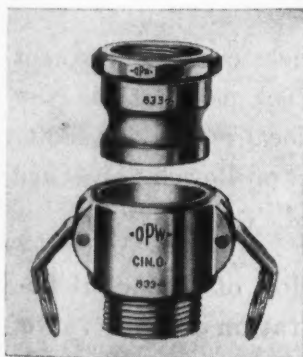
Check 2012 opposite last page.

### Kamlok quick couplings have Viton-A gaskets

Uses: Connecting pipe or hose segments, where periodic disconnection is necessary.

Features: Couplings have Viton-A gaskets. They are suitable for pressures to 200 psi and temperatures to 500°F.

Description: Kamlok quick couplings are available from



Kamloks with Viton-A gaskets are suitable for pressures to 200 psi and temperatures to 500°F

stock in ½ to 6" sizes in aluminum, bronze, monel, stainless steel and semi-steel.

(Kamlok quick couplings are product of OPW-Jordan, 6013 Wiehe Rd., Cincinnati 13, Ohio.)

Check 2013 opposite last page.

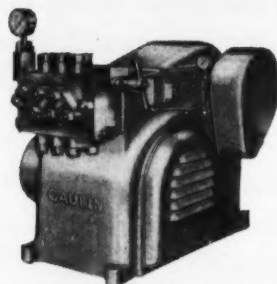
## If you Disperse, Emulsify, Blend Particles or Pump, Control, Move Liquids

# ...GAULIN GTA\*

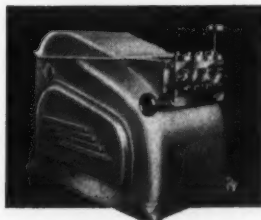
## *Provides the Right Answer!*



### Send for These Free GTA Bulletins



Homogenizers, Sub-Micron Dispersers, and colloid mills produce uniform stable emulsions and dispersions of ultimate fineness.



Triplex Pumps and HX Pumps handle large volumes for transfer, metering or spray drying.

Homogenizers H-55, Laboratory Homogenizers LH-55, Sub-Micron Disperser SMD-55, Colloid Mills C-57, Triplex Pumps P-55, HX Pumps HX-57.

\*Gaulin Technical Assistance starts with the GTA library of product information. Ask for all or specific bulletins on each piece of equipment. Then, call on Manton-Gaulin for specialized Technical Assistance to bring you experienced advice and factual data on the best method to mix or move your product. This GTA combination will save you time when planning and save money when buying.



55 Garden Street, Everett 49, Mass.

World's largest manufacturer of stainless steel reciprocating, rotary, pressure exchange pumps, dispersers, homogenizers and colloid mills

Look To GTA At The Chemical Show — Booth 51 — Nov. 30-Dec. 4

Check 2014 opposite last page.

### Ask GTA...

Gaulin Technical Assistance — for data on the complete Gaulin line: Homogenizers, Colloid Mills, Submicron Disperser, Triplex High Pressure Pumps and HX Pumps. Get GTA from your nearest Manton-Gaulin Representative...

**Akron 8, Ohio**  
White Industrial Sales and Equipment Company  
919 Second National Bldg.  
**Birmingham 6, Alabama**  
D. B. Gooch Associates, Inc.  
5018 First Avenue, North  
**Boston, Mass.**  
Joseph H. Bertram & Company, Inc.  
570 Hillside Avenue  
Needham Heights 94, Mass.  
**Buffalo 6, N. Y.**  
A. W. Johnston Co.  
2021 Clinton St.  
**Calgary, Alberta**  
Harvey Carruthers, Limited  
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**Charleston 1, West Va.**  
White Industrial Sales and Equipment Company  
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Fuente and Webster Inc.  
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**Cincinnati 2, Ohio**  
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**Clearwater, Fla.**  
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P. O. Box 26  
**Cleveland 20, Ohio**  
White Industrial Sales and Equipment Company  
3639 Lee Road  
**Detroit 36, Mich.**  
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19465 James Couzens Highway  
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Aldredge & McCabe  
847 East 17th Ave.  
**Houston 2, Texas**  
Edward Soph Company  
768A M & M Bldg.  
**Indianapolis, Indiana**  
Avels Sales & Engineering Co.  
1407 E. Riverside Dr.  
**Los Angeles 39, Calif.**  
E. M. Underwood and Company  
2901 Rowena Avenue  
**Minneapolis 3, Minn.**  
George R. Mellema Co.  
620 Plymouth Bldg.  
**Montreal 9, P. Q.**  
Richardson Agencies Ltd.  
620 Laurentian Blvd., Suite 4  
Postal Address: P. O. Box 2, Station O,  
Montreal 9, P. Q.  
**Newark, New Jersey**  
Frederick E. Herstein & Associates  
Benninger Building  
1429 Route 22  
Mountainside, N. J.  
**New York City 24, N. Y.**  
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3863 West Pine Blvd.  
**Seattle 4, Washington**  
The Burhans-Sharp Co.  
1731 First Avenue, S.  
**Toronto, Ontario**  
Richardson Agencies Ltd.  
164 Bentworth Ave.  
Postal Address: P. O. Box 8, Station T,  
Toronto 19, Ontario  
**Tulsa, Oklahoma**  
Edward Soph Company  
202 East 18th St.  
**Vancouver 9, B. C.**  
Harvey Carruthers, Limited  
1639 West 5th Avenue  
**West Hartford 7, Conn.**  
Joseph H. Bertram & Company, Inc.  
998 Farmington Avenue



**Low-temperature liquids,**

... such as liquid oxygen at  $-297^{\circ}\text{F}$ , can be handled by centrifugal-pump line. Pumps, which are modification of manufacturers' standard line, are available in 27 models, from  $\frac{3}{4}$  to 6" in size.

(Worthite low-temperature pumps are product of Standard Pump Division, Worthington Corp., Harrison, N.J.)

Check 2015 opposite last page.

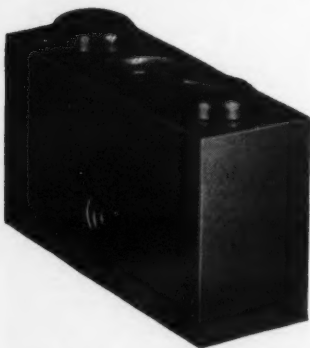
**Supply-pressure failure doesn't cause anguish of bleed-off**

Separate ball for each inlet of check valve

**Uses:** Check-valve applications.

**Features:** Design of valve incorporates separate ball for each inlet. If both supply pressures fail, two inlets are immediately sealed. This prevents bleed-off of downstream pressure.

**Description:** Double-ball check valve is miniature unit. In operation, high pressure of one inlet shuts off low pressure of alternate inlet, holding



If both supply pressures of check valve fail, two inlets are immediately sealed, thus preventing bleed-off of downstream pressure

it closed until pressure of second inlet becomes higher of two.

Body is rated for 100 psi max and temperatures to  $300^{\circ}\text{F}$ . Valve is suitable for services compatible with brass (body material), Neoprene

# POWELL

## FOREMOST IN VALVES FOR CHEMICAL INDUSTRIES

Over a quarter of a century ago, Powell introduced the corrosion resistant valve to fill the needs of the rapidly expanding chemical industries. And now today, after 25 years of experienced manufacture—Powell offers one of the most complete lines of corrosive resistant valves to handle practically every corrosive fluid.

Valves in every size—for 100 pounds W.P. on up!

Valves in every design—globe, angle, gate, check, "Y".

Valves in every possible metal and alloy—stainless steel, silver, nickel, Monel, Hastelloy alloys, acid bronze, aluminum, and other corrosion resistant pure metals and special alloys. *Powell also offers a complete line of bronze, iron and steel valves.*

So for all *your* industry's requirements, Powell has the right corrosion resistant valve in the right size, right design, and right metal. Look us up at the New York Chemical Industries Exposition . . . consult your local Powell distributor . . . or write directly to Powell for complete information on Powell valves and engineering services. We'll solve all your valve problems!

**Powell will be at Booth 133 at the 27th Exposition of Chemical Industries, New York City, Nov. 30-Dec. 4, for consultation on your valve problems. Look us up.**

**THE WM. POWELL COMPANY • CINCINNATI 22, OHIO**

Dependable Valves Since 1846

# POWELL — world's largest family of valves.

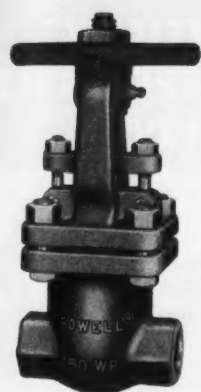


Fig. 2490  
Stainless Steel  
O. S. & Y. Gate Valve.

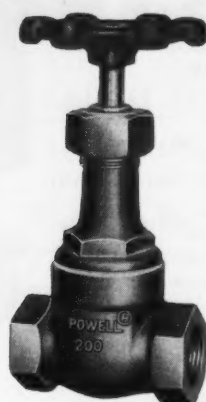


Fig. 1832  
Stainless Steel  
Gate Valve.

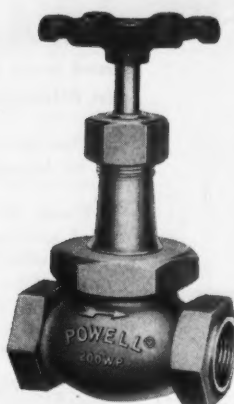


Fig. 1861  
Stainless Alloy  
Union Bonnet  
Globe Valve.

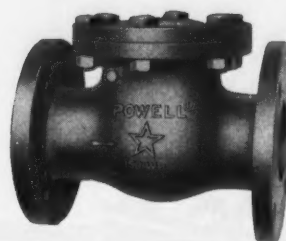


Fig. 2433SS  
Stainless Steel  
Bolted Cap  
Swing Check Valve.

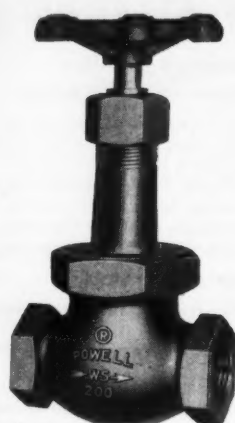


Fig. 2608  
Bronze "W.S."  
Full Flow  
Globe Valve.



Fig. 2310  
Flush Bottom  
Tank Valve.

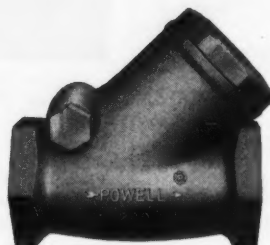


Fig. 560  
Bronze Regrinding  
Horizontal "Y" Type  
Swing Check Valve.



Fig. 2700  
Bronze Inside  
Screw Rising  
Stem Gate Valve.

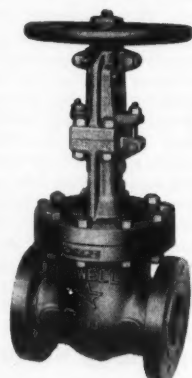


Fig. 3003  
Cast Steel  
Flange End  
Gate Valve.

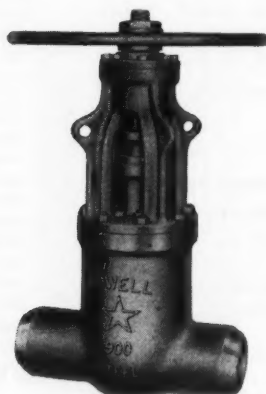


Fig. 19003  
Cast Steel  
Pressure Seal Valve.



Fig. 1793  
Iron Body,  
Bronze Mounted  
Gate Valve.



Fig. 2193  
Ni-resist O.S. & Y.  
Gate Valve.

## ENGINEERING & SAFETY

(O-ring seal) and silicon rubber (check-valve seat). Capacity is approximately 250 scfh at max pressure and critical pressure drop.

(Double-ball check valve 9061 is product of George W. Dahl Company, Inc., Tupelo St., Bristol, R.I.)

Check 2017 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

### Poisons checked in air round-the-clock

Uses: Monitoring air pollution continuously. Unit monitors such toxic materials in air as beryllium, lead, silicon and mercury. Instrument has particular application in beryllium, paint, insecticide and silicon manufacturing facilities.

Features: Unit monitors air automatically on round-the-clock basis.

Description: Automatic air monitoring instrument is small compact spectrographic laboratory. Air is drawn inside unit through horn-shaped tube at rate of three cu ft/min. Tube is located on side panel. Air then passes through special filter-paper tape. Toxic materials are deposited on filter paper. These are, in turn, burned at 6000°C.

Intensity of light given off during burning cycle determines type of toxic material found in air sample through use of spectrometer. Photo multiplier totals amount material which is then recorded on permanent strip-chart and recording meter. Complete process takes 70 sec.

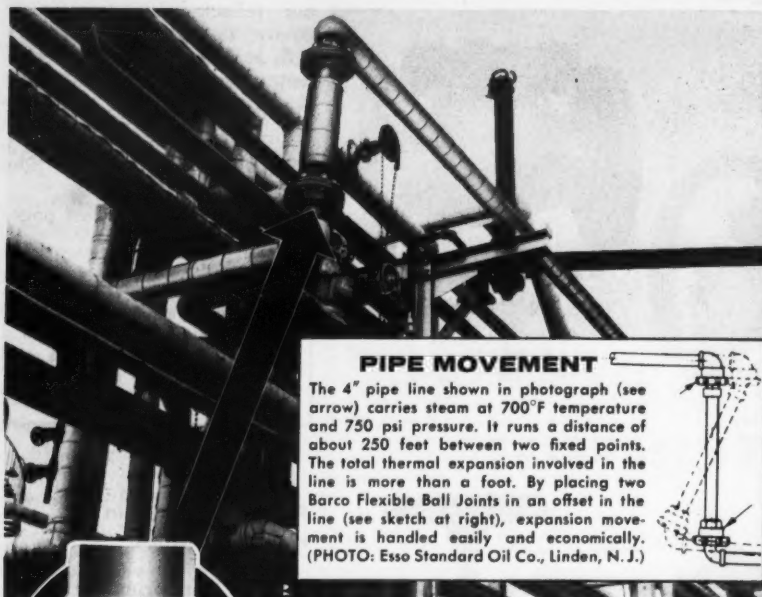
If total amount of toxic material registered on meter is in critical zone, warning horn sounds and red light goes on.

(NSL air monitor is product of National Spectrographic Laboratories, Inc., 6300 Euclid Ave., Cleveland, Ohio.)

Check 2018 opposite last page.

Check 2016 opposite last page.

## How Plant Handles 700°F. STEAM... PIPE EXPANSION



### PIPE MOVEMENT

The 4" pipe line shown in photograph (see arrow) carries steam at 700°F temperature and 750 psi pressure. It runs a distance of about 250 feet between two fixed points. The total thermal expansion involved in the line is more than a foot. By placing two Barco Flexible Ball Joints in an offset in the line (see sketch at right), expansion movement is handled easily and economically. (PHOTO: Esso Standard Oil Co., Linden, N. J.)



## BARCO<sup>HT</sup> Flexible BALL JOINTS SAVE VALUABLE SPACE

### ADVANTAGES:

**SAVE SPACE**—Barco Ball Joints are used to perform functions similar to U-bends or pipe loops—But with much less space required and often LOWER COST.

**NO PRESSURE THRUST**—Expensive anchoring or bracing not required to hold piping in place or in line.

**HIGH TEMPERATURE, PRESSURE**—Wide choice of materials in new Barco HT Joints.

**SIMPLE**—Easy to solve virtually any problem with aid of two or three Barco Joints.

The Barco HT (High Temperature) Flexible Ball Joint is a new development. It is the key to solving many PIPE EXPANSION PROBLEMS where high temperatures and pressures are encountered. The outer sealing gasket is a special, high temperature ring. The inner take up ring is self-adjusting to thermal expansion and maintains tight sealing action without building up high resistance (friction) to turning or angular flexing. HT joints can be supplied in sizes from 1" to 12", angle or straight, and can be fabricated from materials to withstand as much as 1000°F, 1200°F, or even 1400°F, under certain conditions.

Local Barco Field Engineers will be glad to give you full information and recommendations. Call or write today.

Send for this BULLETIN 31

"How to Solve Piping Flexibility Problems". Complete with piping layout drawings and illustrations. Shows how to cut costs, save time, and do a better job!



**BARCO MANUFACTURING CO.**  
537M Mough Street • Barrington, Illinois

The Only Truly Complete Line of Flexible Ball, Swivel, Swing and Rotary Joints  
In Canada: The Holden Co., Ltd., Montreal

Check 2019 opposite last page.

## ENGINEERING & SAFETY

### Rapid filter-aid build-up and easy sluicing in filtration

Disassembly is unnecessary for inspection

Uses: Filtration of industrial process water.

Features: Rectangular diatomite filter incorporates flat, leaf-type filter elements and top take off. These elements



Vacuum leaf-type filter is constructed of Fibreglas-reinforced plastic

lend themselves to rapid build-up of filter aid and easier sluicing when washing. Open-tank construction permits inspection without disassembly.

Description: Vacuum leaf-type filter is constructed of Fibreglas-reinforced plastic, including filter shell, inner leaf-type elements and baffles.

(VFL vacuum leaf-type filter is product of B-I-F Industries, Inc., 345 Harris Ave., Providence, R. I.)

Check 2020 opposite last page.

### Auxiliary motor rolls for belt take-up are avoided

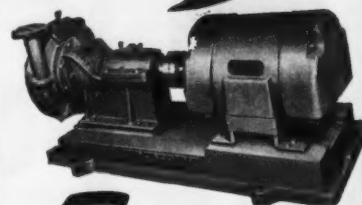
Speed reducer's torque arm is adjustable

Uses: Speed-reducing applications.

Features: Adjustable torque arm eliminates auxiliary motor rolls for belt take-up.

Description: Input shaft of double-reduction shaft-mounted speed reducer is offset from output hub. This provides simple means of taking up belt stretch from primary

Custom-built for  
**EFFICIENT  
DEPENDABLE  
SERVICE**



**Frederick  
SSV PUMPS**

### Enclosed Impeller and Open Impeller Types

You're sure of maximum service and output with minimum maintenance or production down time with Frederick SSV Centrifugal Pumps because each pump is custom-made to fit your particular operation—whatever the consistency or type of liquid you're moving.

### SSV PUMP FEATURES

- Pump sizes from 1" to 4" discharge openings.
- Pump capacities from 50 up to 700 U.S. GPM.
- Heads from 30 up to 220 feet.
- Pump speeds can be varied to suit the driving media and operating conditions.

### CONSTRUCTION ADVANTAGES

Pump casings are vertically split for easy accessibility. Mounted on a swivel to permit placing discharge in any desirable position. Pump openings, both suction and discharge, flanged to permit easier connection and disconnecting to joints. One-piece impellers, securely attached to shaft by stout key and lock nut, or threaded, give long service. Pump bearings mounted in sturdy frame horizontally split for easier accessibility. Extra long stuffing box provides for oversize stuffing. Mechanical seal also available for minimum leakage. Pump coupling flexible for direct connection to drivers or can be arranged for belt drive. Pump speed, pump openings, etc. are selected to suit your particular requirements.

Write for Bulletin No. 107



FREDERICK IRON AND STEEL, INC.  
FREDERICK, MD. 21701 MARYLAND

Check 2021 opposite last page.

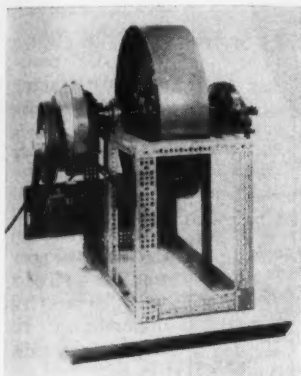
CHEMICAL PROCESSING



## ENGINEERING & SAFETY

drive. Adjustable torque arms rotate reduction unit about its output shaft. Thus, center distance between belt pulleys is increased or decreased.

Speed reducer mounts on shaft of driven machine by means of tapered-bushing ar-



Speed reducer mounts on shaft of driven machine by means of tapered-bushing arrangement

angement. It is available in two reduction ratios—13:1 and 20:1—and six capacities to handle fractional- to 40-hp drives.

(Offset Shaft-King speed reducers are product of The American Pulley Company, 4214 Wissahickon Ave., Philadelphia 29, Pa.)

Check 2022 opposite last page.

Lubricated plug valves are reviewed in detail in Cat 39-1 — Homestead Valve Manufacturing Company, Box 140, Coraopolis, Pennsylvania.

Check 2023 opposite last page.

Electric-eye applications in process industries, in problem and solution form, are covered in Bul 522—Photomation, Inc., 96 S. Washington Ave., Bergenfield, N.J.

Check 2024 opposite last page.

Metallizing receives full treatment in 322-page hard-cover-bound book. This volume includes sections on machine element work, corrosion-resistant coatings, production metallizing, ventilation and safety measures. "Metallizing Handbook" is available at \$5.00 per copy from Metallizing Engineering Company, Inc., Westbury, L.I., New York.

# TRENT

YOUR SINGLE SOURCE FOR  
EVERY ELECTRICAL HEATING NEED

## HEATING ELEMENTS

### TUBULAR HEATERS

for Tanks, Kettles, Baths, Extruders

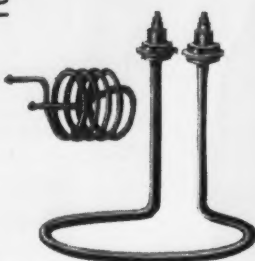
### STRIP HEATERS

for Ovens, Dryers, Process Equipment

### CARTRIDGE HEATERS

for Dies, Molds, Platens, Defrosting

### OIL & WATER IMMERSION HEATERS



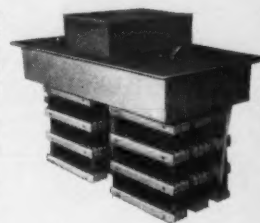
The Complete Line of TRENT Metal Sheathed Heating Elements Assure On-the-Spot Controlled Heat to Your Most Exacting Requirements. Write for Bulletin 74-TE.

## "FOLDED-AND-FORMED" HEATING UNITS

Packaged Units for High Temperature Controlled Heating of Forced Air Installations.

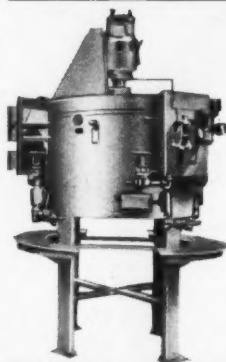
### FHP TYPE HEATING UNIT PLUG FEATURES

- TRENT "Folded-and-Formed" Heating Elements—greater radiating surface per square inch of cross section than any other electrical heating element!
- Maximum Frame Temperatures to 1350°F!
- Velocities up to 4000 Ft./Min.!
- Watt Densities from 10 to 30 Watts per Sq. Inch!
- 120, 240, 480 or 600V—3 Phase or Single Phase!
- Wired, Mounted, Insulated complete with Terminal Box—Ready for Installation!

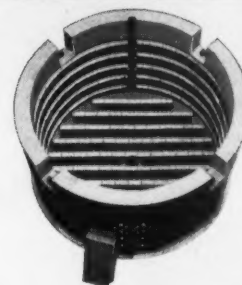


TRENT "Folded-and-Formed" Racks and Plugs add up to Faster Heating and Cooling, Longer Element and Unit Life . . . Better Controlled Heat at Lower Cost! Write for Bulletin 102T.

## KETTLES AND JACKETS



- 5 Gallon to 325 Gallon Capacity Kettles for Waxes, Oils, Resins, Salts, Asphalts.
- TRENT "Folded-and-Formed" Heating Elements in Metal Inner Liner.
- Complete Temperature Control to Prevent Overheating, Scorching, Hot Spotting.



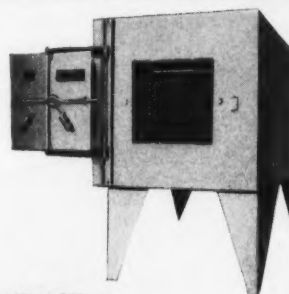
- Jackets for Retorts, Reactors and Autoclaves
- High Temperature Uniformity to 2000°F.
- Compact, Space Saving Design
- Low Thermal Inertia—High Dielectrical Strength (600V)
- Economical Installation and Maintenance
- Special "Folded-and-Formed" Roller Heaters Designed and Built to Your Specifications

Write for Bulletin 72-TE.

## ELECTRIC FURNACES

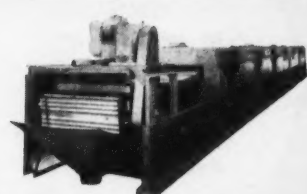


**BOX TYPE FURNACES** for Hardening and Annealing Steel, Aluminum; Firing Ceramics; Processing Chemicals. Controlled Temperatures up to 2000°F.



**ANNEALING FURNACES** specially designed for Glass and Steel applications in production and laboratory. Temperature range up to 1400°F.

Other TRENT Furnaces Designed for Uniform, Controlled Heat at Temperatures to 2700°F.



**CONVEYOR FURNACES** for Glass Annealing, Baking Resistors, Ceramic Molding, Chemical Drying, Annealing Ferrous and Non-Ferrous Metals

- Controlled Heat up to 1850°F.!
- Designed and Built to Your Specifications!

Write for Bulletin 75-TC.

TRENT ENGINEERS will help you determine the most efficient and economical solution to your heating problems. Contact a Trent representative today!



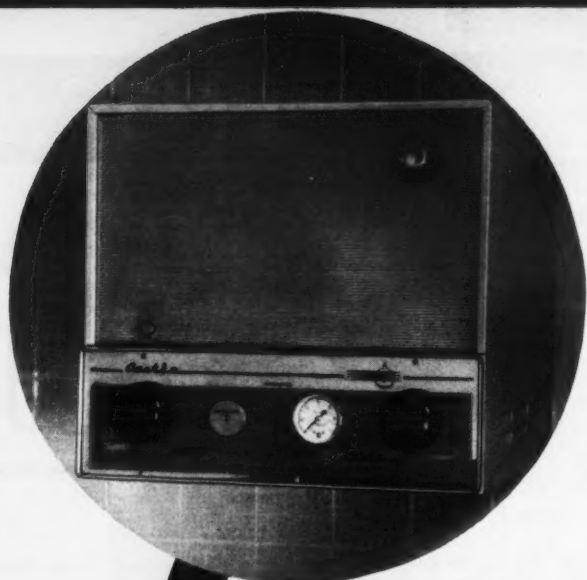
INC.

Electrically Heated Industrial Equipment

235 LEVERINGTON AVENUE, PHILADELPHIA 27, PA.

In Canada Supreme Power Supplies Limited, Toronto 14

Check 2025 opposite last page.



# CES FOR INDUSTRY

Castle Engineered Sterilization—Know-how based on accumulated experience in the industrial fields—new products to help you do the job.

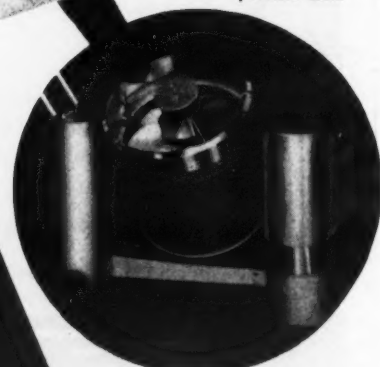
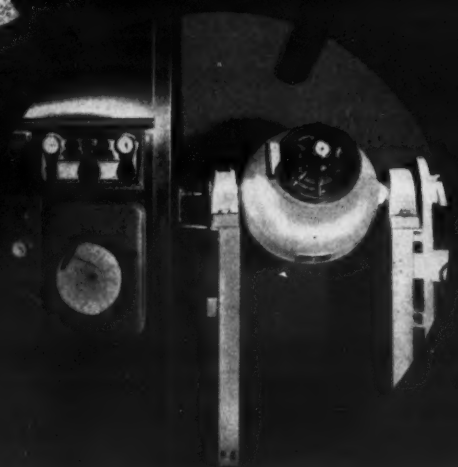
CES has pooled resources, knowledge and experience with leaders like Selas, Celanese and Pfaudler to develop these important new products for use in the Food, Chemical and Pharmaceutical industries. Look for them on display at the CHEM SHOW in New York at Booth No. 1033.

CES is a program developed to bring to industry technical assistance in solving sterilizing and decontamination problems. This program is at your disposal without cost or obligation.

**CASTLE-SELAS, The Castle Steril-Aqua:** CES recently announced Steril-Aqua, newest and most economical method of producing high purity water (sterile when required) for the process industries.

**CASTLE-CELANESE, The Castle BPL Equipment:** CES has new equipment for vaporizing Celanese Beta-Propiolactone to sterilize contamination areas. Complete laboratories, storage rooms and work areas may now be sterilized, a formerly impossible task.

VISIT BOOTH  
NUMBER  
**1033**  
at the  
**CHEM SHOW**  
Nov. 30 to Dec. 4



*Castle*  
STERILIZATION

## WHAT DO YOU THINK?

Opinions and comments on the significant subjects carried in each month's **CHEMICAL PROCESSING** are important! We welcome your letters expressing your views. Many CP readers are taking the opportunity to state their views on today's top questions. By publishing your letters in **CHEMICAL PROCESSING**, others will have the opportunity to hear your side.

## Perhaps you agree

with what has been written in these articles.

## Maybe you don't.

You might even have a thought or angle which wasn't expressed.

If so, why not let us and others hear your ideas? Suitable letters will be published in our regular "Letters from Readers" column. (See page 12.)

Address your comments to:  
The Editor  
**CHEMICAL PROCESSING**  
111 E. Delaware Place, Chicago 11, Illinois

For more information on product at left, specify 2026 see information request blank opposite last page.





#### Roads and driveways

... can be repaired and patched with temperatures as low as 15°F on wet or dry surfaces, with recently developed repair material. Chuck-holes, breaks, cracks and edges of asphalt and black-top pavements can be repaired on the spot. In use, material may be poured into hole or rut and tamped down. It can be driven over immediately.

(Zor-X repair material is product of The Monroe Company, Inc., 10703 Quebec Ave., Cleveland 6, Ohio.)

Check 2027 opposite last page.

#### Double-duty cleaning with ultrasonic unit

**Uses:** Small parts cleaning, laboratory processing and investigation of various ultrasonic phenomena.

**Features:** Cleaner has twin beakers to handle two jobs at once. It is possible to wash and rinse parts or use two different solutions at same time. Also, stainless-steel tank may be used without beakers.

**Description:** Ultrasonic cleaning unit incorporates ultrasonic generator, transducerized ultrasonic tank and two 400-ml Pyrex-glass beakers.

(SonBlaster ultrasonic cleaner is product of The Narda Ultrasonics Corporation, 625 Main St., Westbury, L.I., New York.)

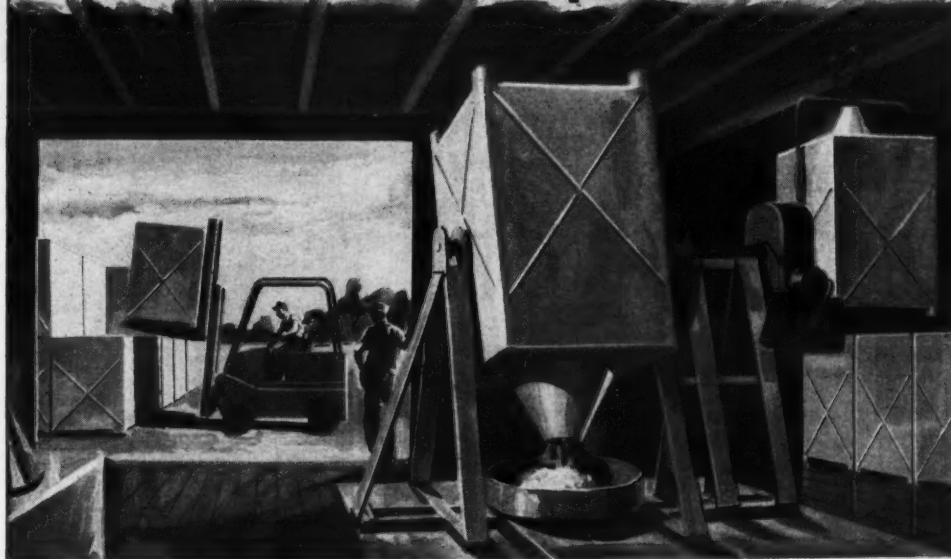
Check 2028 opposite last page.

**Recommended-pipe-practice** information is summarized in picture-diagram form on wall chart covering selection, installation and maintenance of valves. "Recommended Piping Practice"—The Lunkenheimer Company, Beekman St. at Waverly Ave., Cincinnati 14, Ohio.

Check 2029 opposite last page.



## Waste of labor and product is obsolete...



\* Lic. under pat. #2862645

Waste of labor, product, floor space, time is now outmoded—eliminate it in your plant today.

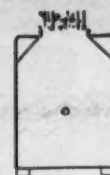
Powell's new Invert-a-bin\* Semi-Bulk Handling System has put an end to the biggest headache in handling granular products. These sturdy, easy-to-handle steel or aluminum containers are easy to fill and easy to empty. Weatherproof, they can be stored outdoors freeing indoor storage areas for production.

Ideal for inter-plant or intra-plant these units are considered part of special rail car with "freight free" advantages. Due to the simplicity of design, maintenance of the Invert-a-bin\* is nil.

Why continue losing time and money with old style disposable packages when this remarkable new Invert-a-bin\* is immediately available on either lease or purchase. Write for literature today!

### THE POWELL PRESSED STEEL COMPANY

HUBBARD, OHIO



**Fills Fast**—22" opening permits fast filling of powdered materials. Internal cone conforms to angle of repose of product.



**Empties Clean**—Internal cone funnels all materials out of bin. No residue remaining.



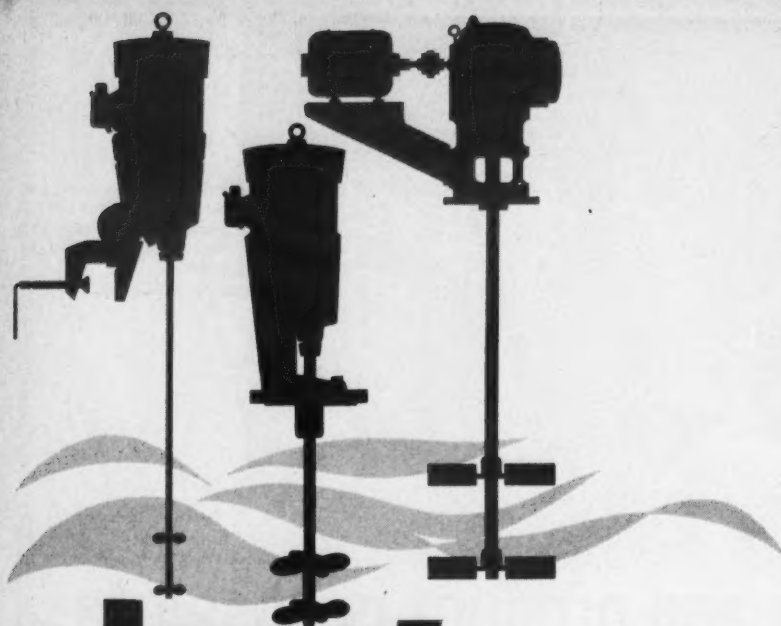
**Stores Outdoors**—Weather-proof, turns yard area into warehouse. Stacks 2 high.



**Cuts Shipping Costs**—low cost flat-bed equipment considered part of special rail car with "freight free" advantages.

Check 2030 opposite last page.





# NEW FROM MIXCO

## 3 WAYS TO GET MORE FLUID MIXING FOR YOUR MONEY

What's new in fluid mixing? Plenty! See it for yourself at the New York Chem Show, opening November 30.

Here's a preview of ideas from MIXCO that can help you *get more* from your fluid-mixing operations. More productivity. Longer equipment life. Lower mixing cost. And—yes—*lower first cost*.

**1. New concept in portable mixing.** Here's the latest look in portable mixers... simple, smooth, rugged. Features include new speeds, internal gearing, a unique positive-drive chuck, new clamping and positioning arrangement and improved propeller design.

**2. New fixed-mounting mixers.** Most of the same innovations have been carried over to the full line of LIGHTNIN fixed-mounting propeller mixers.

**3. New economy for big mixing jobs.** You'll see a new line of turbine-type LIGHTNIN Mixers—Series RE—designed specifically for jobs in which cost is a paramount consideration.

You'll want the whole story on these exciting new developments. So join us at Mixco Booth 146.

**Lightnin Mixers**

MIXCO fluid mixing specialists

MIXING EQUIPMENT Co., Inc., 185-m Mt. Read Blvd., Rochester 3, N. Y.

In Canada: Greey Mixing Equipment, Ltd., 100 Miranda Ave., Toronto 19, Ont.



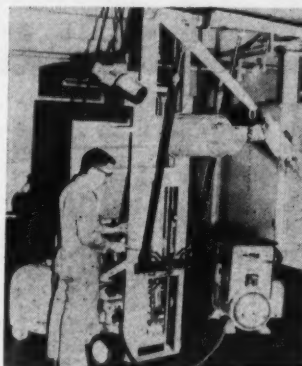
Check 2031 opposite last page.

### ENGINEERING & SAFETY

#### Radioactive-area work safely handled by robots

Robots with ability of lift  $\frac{1}{2}$  ton of dead weight or repair delicate machinery are being developed by nuclear and research specialists of Babcock & Wilcox Company to do maintenance and repair work in radioactive areas dangerous to humans. The automatons were developed for use with new-type reactor for U.S. Atomic Energy Commission.

Basic components of two mechanical robots are lift truck and radio-remote-controlled tractor. Largest, most versatile robot is three-ton, eight-foot-tall lift truck. TV camera is mounted on its mast. This provides clear view of work being performed.



Lift truck is fitted with TV camera to provide clear view of work being performed. Remote-controlled truck can thread pipe or turn valve, as well as raise heavy drum and hold it 15' high

Truck can thread pipe or turn valve, as well as raise heavy drum and hold it 15' aloft.

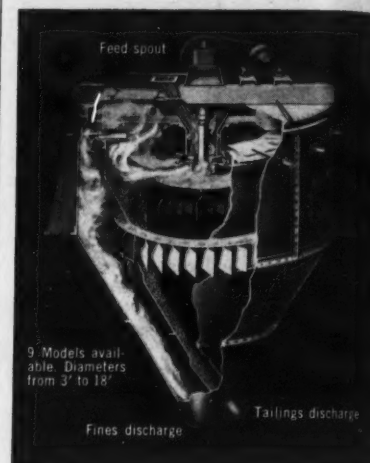
Radio-remote-controlled tractor will be used for towing trailer-loads of radioactive materials. By means of radio waves emitted from control box operated at distance, tractor will perform commands given it. This would include starting, stopping and reversing direction of travel.

(Radox remote-controlled tractor and TTF Hi-Lift truck are products of Barrett-Cravens Co., 628 Dundee Rd., Northbrook, Ill.)

Check 2032 opposite last page.

## Size Requirements Getting Tougher?

**Sturtevant Air Separators Increase 40 to 400 Mesh Output as Much as 300%**



**Closed-circuit** air separation is of proved advantage in reduction processes. Result is a better, more uniform product. Grinding mills perform at top efficiency, output frequently increases as much as 300%, power costs drop as much as 50%.

**Precise separation** of all dry powdered materials. Sturtevant's currently classify sulfur, soybeans, phosphate, chocolate, feldspar, sand and aggregates, pigments, limestone fillers, flour, abrasives, plastics, gypsum, ceramics, cement and other products.

**Improve screening** — Sturtevant Air Separators prevent blinding by removing undesirable tailings or fines from screen feed loads.

#### Works Like Winnowing Done in a Whirlwind

Sturtevant Air Separators do a mechanical job of winnowing. Precise control of whirlwind air currents and centrifugal force results in the desired size being lifted into fines cone, oversize falling into tailings cone.

A 16 ft. Sturtevant, for example, has taken a feed rate of 800 tph, containing only a small percentage of desired fines, and delivered 30 tph 90% 200 mesh, recirculating the oversize through the grinding circuit.

Send for Bulletin No. 087.

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MILL COMPANY

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Crushers • Grinders • Micron-Grinders • Separators  
Blenders • Granulators • Conveyors • Elevators

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Check 2033 opposite last page.

CHEMICAL PROCESSING



## new literature

Reviews of publications pertinent to the industry. Additional reviews are found throughout other sections of this magazine

**Ammonia production** at 350 atmospheres is detailed along with process information, flow sheet, and photographs in six-page Ammonia Booklet—Girdler Construction Division, Chemetron Corporation, PO Box 174, Louisville 1, Kentucky.

Check 2034 opposite last page.

**Methanol** — as produced by the Inventa-Vulcan process is outlined in four-page illustrated bulletin. Photos and flow diagram are included. Historical background of process is briefly reviewed. Methanol Bul — Vulcan-Cincinnati, Inc., 120 Sycamore Street, Cincinnati 2, Ohio.

Check 2035 opposite last page.

**Fish meal dryer** that operates at low temperature is topic of eight-page bulletin. Photographs, flow diagram, and design data are included. Bul 596—Standard Steel Corporation, 5001 S. Boyle Ave., Los Angeles 58, Calif.

Check 2036 opposite last page.

**Acetophenone** is reviewed in a 12-page bulletin containing data on reactions and pharmaceutical applications. Bul F-6970B—Union Carbide Chemicals Company, Div. of Union Carbide Corporation, 30 East 42nd St., New York 17, New York.

Check 2037 opposite last page.

**Battery-charger operation** and maintenance are discussed in four-page bulletin. Covers vertical motor-generator chargers for electric industrial-truck batteries and for other motive-power applications. Form 5845—Exide Industrial Division, The Electric Storage Battery Company, Rising Sun and Adams Avenues, Philadelphia 20, Pennsylvania.

Check 2038 opposite last page.

**Sulfur dioxide** safe handling is dealt with in a bulletin which serves as useful reference guide for personnel engaged in transporting, storing and using the chemical. Bul I-173—Inorganic Chemicals Division, Monsanto Chemical Company, 800 N. Lindbergh Blvd., St. Louis 6, Mo.

Check 2039 opposite last page.

**Truck-operator training**—A 20-page instructors' manual is intended as a guide for a training program for industrial truck operators. It delves into good driving practices, shows details of construction of principal types of trucks, explains practical operation of the truck, and outlines test procedures. Instructors' Manual—Automatic Transportation Company, Division of The Yale & Towne Manufacturing Company, 146 W. 87th St., Chicago, Ill.

Check 2040 opposite last page.

**Crawler tractor** powered by 225-hp turbocharged diesel engine is fully depicted in 16-page Cat MS-1243 — Construction Machinery Division, Allis-Chalmers Manufacturing Company, Milwaukee 1, Wisconsin.

Check 2041 opposite last page.

**Laboratory chromatograph** receives full treatment, including sections on principles of chromatography, applications, natural gasoline analysis, accessories, and specifications, in Bul 1831—Analytical and Control Instrument Division, Consolidated Electrodynamics, 360 Sierra Madre Villa, Pasadena, Calif.

Check 2042 opposite last page.

**Hydraulic pallet truck** has specifications and operating details put forth in four-page circular. The 200-lb vehicle has 2000-lb capacity. Circular 26C — Dept. R9-24, Lewis-Shepard Products, Inc., 125 Walnut St., Watertown 72, Mass.

Check 2043 opposite last page.

**Basis weight scales**, wall type, for use in weighing paper are illustrated and described in four-page bulletin. Accuracy is 1/10 pound per ream. Bul 321-BW—Thwing-Albert Instrument Company, Penn St. and Pulaski Ave., Philadelphia 44, Pennsylvania.

Check 2044 opposite last page.

**Metal packings** for pumps, engines, and compressors are covered in 24-page booklet Bul AD-166—The Garlock Packing Company, 438 Main St., Palmyra, New York.

Check 2045 opposite last page.



## ALL YOU WANT TO KNOW ABOUT PUMPS for corrosive and slurry service

Complete engineering data — dimensions, performance curves, parts lists and specifications on the entire Dorr-Oliver line of alloy metal, lined and diaphragm-type pumps — *all in one big bulletin!* Here's everything you need to solve difficult pumping problems . . . just off the press!

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Detroit, Michigan  
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P. O. 14496, Houston 21, Texas  
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Tel.: Regent 3526 (Buffalo)

Simonds Pump Company  
455 East 4th St., Los Angeles, Calif.  
Tel.: Mutual 8321

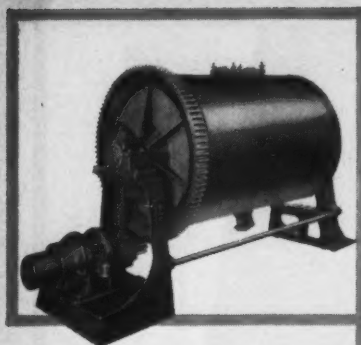


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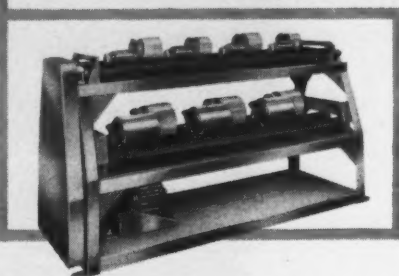
Check 2046 opposite last page.





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Pulverizing and Grinding Operations.

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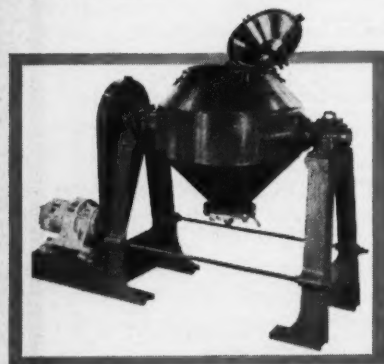
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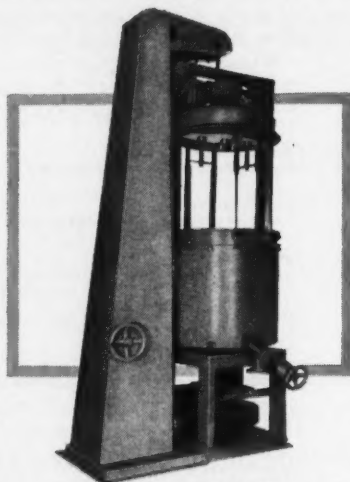
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Check 2047 opposite last page.

## NEW LITERATURE

Overhead track scales and combination track-dormant scales form subject of four literature pages. Shallow-pattern design permits installation where headroom is at premium. Series 1700 Track-scale Literature — Detecto Scales, Inc., 540 Park Ave., Brooklyn 5, N.Y.

Check 2048 opposite last page.

Four cryogenerators are explained in six-page brochure which incorporates curves showing relationships between refrigeration capacities, condensing temperatures, and brake horsepower. Cryogenerator Brochure—Cryogenics Division, North American Philips Company, Inc., 100 Stevens Ave., Mt. Vernon, N.Y.

Check 2049 opposite last page.

Angle and Y-valves constructed of fiber-glass-reinforced plastic bonded to chemical porcelain, which are available in 1/2, 1, 1 1/2, 2, 3, 4 and 6" sizes, are delineated in Tufclad Valve Literature — Process Equipment Division, Lapp Insulator Co., Inc., 2106 Wendell St., Le Roy, N.Y.

Check 2050 opposite last page.

Conveyor-elevator system is expanded upon in Cat 358 — Engineering Division, Stephens-Adamson Mfg. Co., 11 Ridgeway Ave., Aurora, Ill.

Check 2051 opposite last page.

Bonded-mica-insulation line is outlined in 16-page booklet containing information on grades, forms, sizes, weights, and specifications. "CDF Micabond"—Continental Diamond Fibre Corporation, Subsidiary of The Budd Company, Newark, Del.

Check 2052 opposite last page.

Liquid penetration tester for determining sizing of paper is described in two-page Bul 373-ST—Thwing-Albert Instrument Company, Penn St. and Pulaski Ave., Philadelphia 44, Pa.

Check 2053 opposite last page.

Wire cloth and its role in solids-liquids separation are topics covered in Cat 57 — Multi-Metal Wire Cloth Co., Inc., 1356 Garrison Ave., New York 59, N.Y.

Check 2054 opposite last page.



**Babbitt** Adjustable SPROCKET RIM  
with Chain Guide  
CHANGES THAT DANGER ZONE TO A  
SAFETY ZONE



The distance between the floor of your plant and your overhead valves is a DANGER ZONE when piled up boxes or even ladders are used to reach the valves. Turn it into a SAFETY ZONE — equip your overhead valves with Babbitt Adjustable Sprocket Rims with Chain Guides.

- They simplify pipe layout.
  - They fit any size valve wheel.
  - They are easy to install and operate.
  - They operate any valve from the floor.
  - They save time and money.
  - The first cost is the only cost (no maintenance).
  - They are packed completely assembled (one to a carton), with easy-to-follow instructions.
  - A hot-galvanized rust proof chain is available for all sizes.
- Babbitt Adjustable Sprocket Rims with Chain Guide are carried in stock by most mill supply houses. If your supplier does not carry them, contact us direct.

**Babbitt** STEAM SPECIALTY CO.

14 BABBITT SQUARE, NEW BEDFORD, MASS., U.S.A.

Check 2055 opposite last page.

CHEMICAL PROCESSING



## NEW LITERATURE

**Tubular-part-production economics** is considered in eight-page article reprint, which compares purchasing of tubing with drilling solid-bar stock, in making tubular parts. It also describes various methods by which proper tube specifications can save production costs. "How To Choose And Use Tubing"—Superior Tube Company, 1512 Germantown Ave., Norristown, Pa. Check 2056 opposite last page.

**PVC pipe, fittings, valves, sheet and joining strips** are among items included in PVC Products Cat — Industrial Division, Colonial Plastics Mfg. Co., Subsidiary of The Van Dorn Iron Works Co., 2685 E. 79th St., Cleveland 4, Ohio. Check 2057 opposite last page.

**Specifications and operating advantages** of a 24" pump-through pulp refiner are reviewed in four-page bulletin. The compact unit has capacity of up to 50 tons per day and is designed primarily for small and medium-sized paper mills. Bul P-31—The Bauer Bros. Co., 1728 Sheridan Ave., Springfield, Ohio.

Check 2058 opposite last page.

**Packaged generators** for producing from 250 to 5000 cfm high purity hydrogen are described in detail in four-page bulletin. Bul H459—Gas Atmospheres, Inc., 20011 Lake Rd., Cleveland 16, Ohio.

Check 2059 opposite last page.

**Belt conveyors**, of sectional type in belt widths of 18, 24, 30 and 36", are listed in Cat 2779 — Link-Belt Company, Prudential Plaza, Chicago 1, Ill.

Check 2060 opposite last page.

**Lift trucks** of 3000-, 4000-, and 5000-lb capacity are detailed in eight-page brochure. Monotrol control system provides "hands-off" direction control. Space-Saver 30-40-50 Brochure—Hyster Company, PO Box 847, Danville, Ill.

Check 2061 opposite last page.

**Vibrators** of electric and air types are presented in Vibrator Literature — Dept. 11C, The Cleveland Vibrator Company, 2706 Clinton Ave., Cleveland 13, Ohio.

Check 2062 opposite last page.

**USING SCREEN SEPARATIONS?  
NOTHING CLASSIFIES AS  
PERFECTLY AS AIR**



**UNIVERSAL ROAD MACHINERY CO.**

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RANGE 60 to 400 mesh.

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Choice of Standard or

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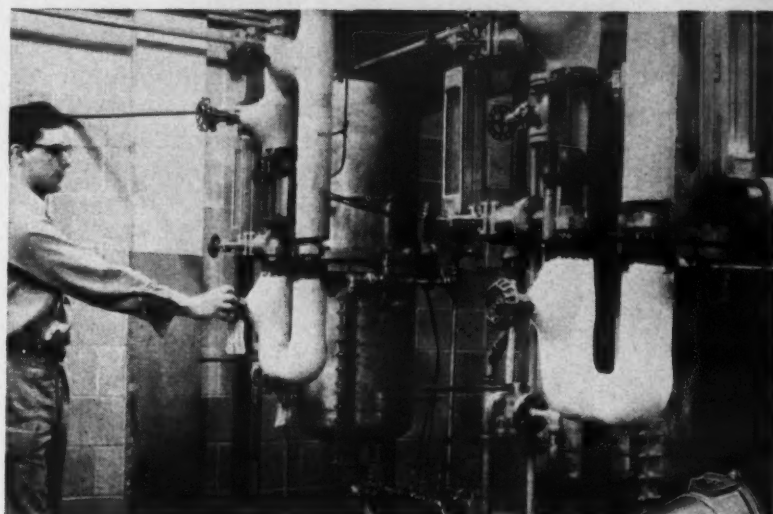


this helpful booklet sent on request

Check 2063 opposite last page.

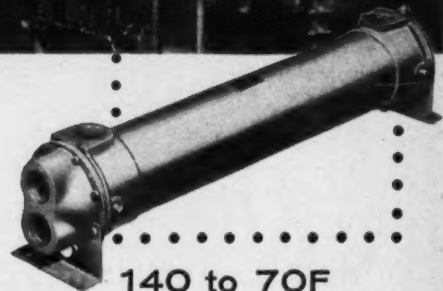
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## Young Helps Tame Hot Nitric Acid!



**Young**

**Stainless Steel  
Heat Exchanger**  
lowers temp from  
140 to 70F  
with minimum pressure drop!



The problem: How to recover 140F nitric acid used in development work at Abbott Laboratories? The solution: Install Young Stainless Steel Heat Exchanger to lower the acid temperature to a convenient 70F with minimum pressure drop. All component parts of the heat exchanger are constructed from #316 stainless steel and require little or no maintenance, even with liquids as corrosive as nitric acid. Tubes are rolled into header by an electronically controlled process making a highly efficient joint. The entire unit is engineered to withstand maximum expansion strains.

Ideally suited for use with highly corrosive liquids or gases, Young Stainless Steel Heat Exchangers are available in single or multi-pass units. If you have a corrosive cooling problem, consult Young Radiator Co. — without obligation.

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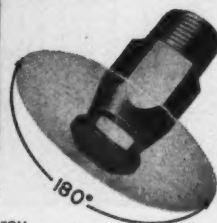
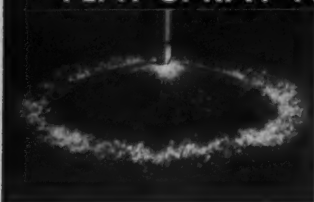
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## Steinen

### New Nozzles

#### \* SPAN-JET

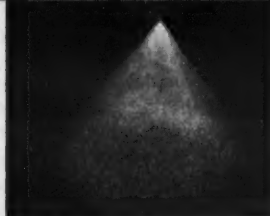
#### FLAT SPRAY NOZZLES



For spraying or washing inside of tubular units or other uses where a circular wide-angle spray is needed. Made in two patterns — 160° hollow-cone spray or 180° flat-circular spray. Available in brass or 303 stainless steel — others on request. Sizes  $\frac{1}{8}$ " —  $\frac{1}{4}$ " —  $\frac{3}{8}$ " male conn.

### TAN-JET

#### SOLID CONE NOZZLES

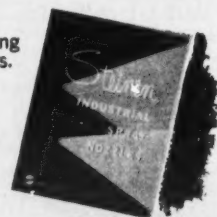


Non-clogging nozzles having a uniform solid-cone spray pattern, furnished in brass, steel, 303 stainless or other suitable materials for any application or process which involves spraying of fluids. Sizes  $\frac{1}{4}$ " —  $\frac{3}{8}$ " —  $\frac{1}{2}$ " male or female conn.

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#### FEATURING:

- 32 pages of basic engineering data and nozzle applications.
- New Spray Nozzles for various applications.
- Large selection of spray angles and capacities.
- Simplified, time-saving nozzle selection tables.



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SERVING INDUSTRY FOR MORE THAN FIFTY YEARS

Check 2065 opposite last page.

#### NEW LITERATURE

**Latices** consisting of styrene and butadiene and used for rug backing are detailed in 36 page Tech Bul C-9-191 — Plastics Division, Koppers Company, Inc., 801 Koppers Building, Pittsburgh 19, Pa.

Check 2066 opposite last page.

**Conduit**, designed to withstand corrosive atmospheres, is presented in Folder DEK-3 — Steel and Tubes Division, Republic Steel, 207 E. 131st St., Cleveland 8, Ohio.

Check 2067 opposite last page.

**Filter-pump units** which handle all acid and alkaline solutions and solvents at temperatures up to 250°F. are presented in eight-page Bul 751. — Sethco Manufacturing Corp., 2287 Babylon Turnpike, Merrick, L.I., N.Y.

Check 2068 opposite last page.

**Tetranitromethane's** uses in liquid and solid high energy fuels are summed up in three-page Technical Data Sheet No. 104 — Hummel Chemical Company Incorporated, 90 West St., New York 6, New York.

Check 2069 opposite last page.

**Perforated screens** are detailed in General Cat — The Harrington & King Perforating Co. Inc., 110 Liberty St., New York, N.Y.

Check 2070 opposite last page.

**Spray nozzles** for washing, cooling, processing, humidifying, dehydrating and other applications are detailed in Cat 5600—Binks Manufacturing Company, 3120-32 Carroll Ave., Chicago 12, Ill.

Check 2071 opposite last page.

**Immersion firing** is treated in four-page bulletin, which is fourth and review number in a series on this subject. Bul 4—Sellers Engineering Company, 4876 N. Clark St., Chicago 40, Ill.

Check 2072 opposite last page.

**Polyvinylpyrrolidone's** effectiveness in reducing toxicity and sensitivity problems inherent in phenols and other compounds is discussed in eight-page Bul TA-52—Antara Chemicals, Div. of General Aniline & Film Corporation, 435 Hudson St., New York 14, N. Y.

Check 2073 opposite last page.

**Line strainers** for spray-nozzle systems and related applications are detailed in Bul 94 — Spraying Systems Co., 3216 Randolph St., Bellwood, Ill.

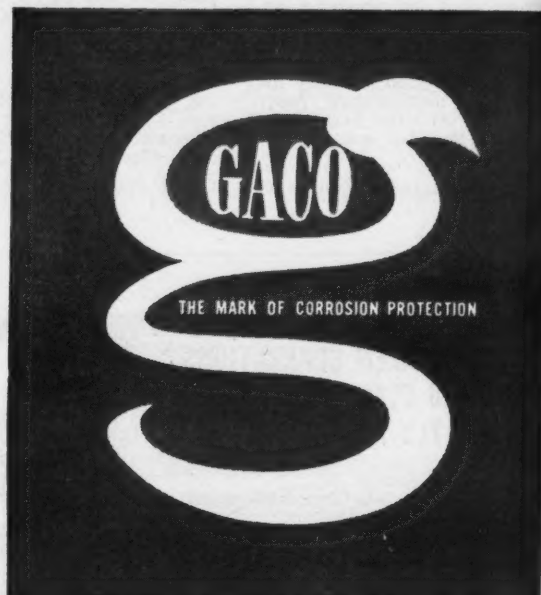
Check 2074 opposite last page.

# NEW

## GACO H-1 and H-2

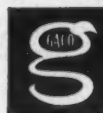
### Hypalon maintenance coatings and liquid linings

Bright fast colors, air cure, high tensile, and greater hiding power feature GACO formulations of Hypalon, the new duPont synthetic rubber with superior corrosion resistance. GACO Hypalon coatings are unaffected by ozone, have unusual weather and abrasion resistance, and are suitable for continued use at elevated temperature. Wide choice of color with no sacrifice in other physical properties open new areas of application for GACO Hypalon coatings. Write for details.



### FOR HEAVY-DUTY CORROSION SERVICE THE GACO CORROSION PROTECTION SYSTEM

Challenge: When paint or ordinary corrosion protection products won't do the job, specify GACO. A complete line: Neoprene, Natural Rubber, Vinyls, Liquids, Sheet, Putties . . . performance-proven in applications throughout the world. *And A Complete Service.* There's a GACO Corrosion Specialist in your area prepared to serve your needs. Write for further information—we'll forward case studies of interest.



THE MARK OF CORROSION PROTECTION

**GATES ENGINEERING COMPANY**

Wilmington 99, Delaware

PIONEER LEADER IN PROTECTIVE COATINGS

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Check 2075 opposite last page.

CHEMICAL PROCESSING



## NEW LITERATURE

Research activities, including bench-scale and pilot-scale development services, such as process improvement, efficiency improvement of unit operations, and development of new equipment and products, are considered in Research Activity Literature — Technical Director, Chemical Construction Corp., 525 W. 43rd St., New York 36, N.Y.

Check 2076 opposite last page.

Teflon-lined pipe and fittings are pictured in four-page Bul TS-1A — Resistoflex Corporation, Roseland, New Jersey.

Check 2077 opposite last page.

Air-hoist series is introduced with specifications and illustrations in four-page brochure. Sectionalized drawings shows 19 major features of the 500-, 1000-, and 2000-lb-capacity models. Bul ADH-79 — Coffing Hoist Division, Duff-Norton Company, 800 Walter St., Danville, Ill.

Check 2078 opposite last page.

Wire cloth is reviewed in 94-page Wire Cloth Cat — Dept. F, The Cambridge Wire Cloth Co., Cambridge 11, Md.

Check 2079 opposite last page.

Tube-type filters, with any desired degree of micro-clarity for all types of industrial fluids, are among filters covered by Filter Cat — Dept. CP, Commercial Filters Corporation, Melrose 76, Massachusetts.

Check 2080 opposite last page.

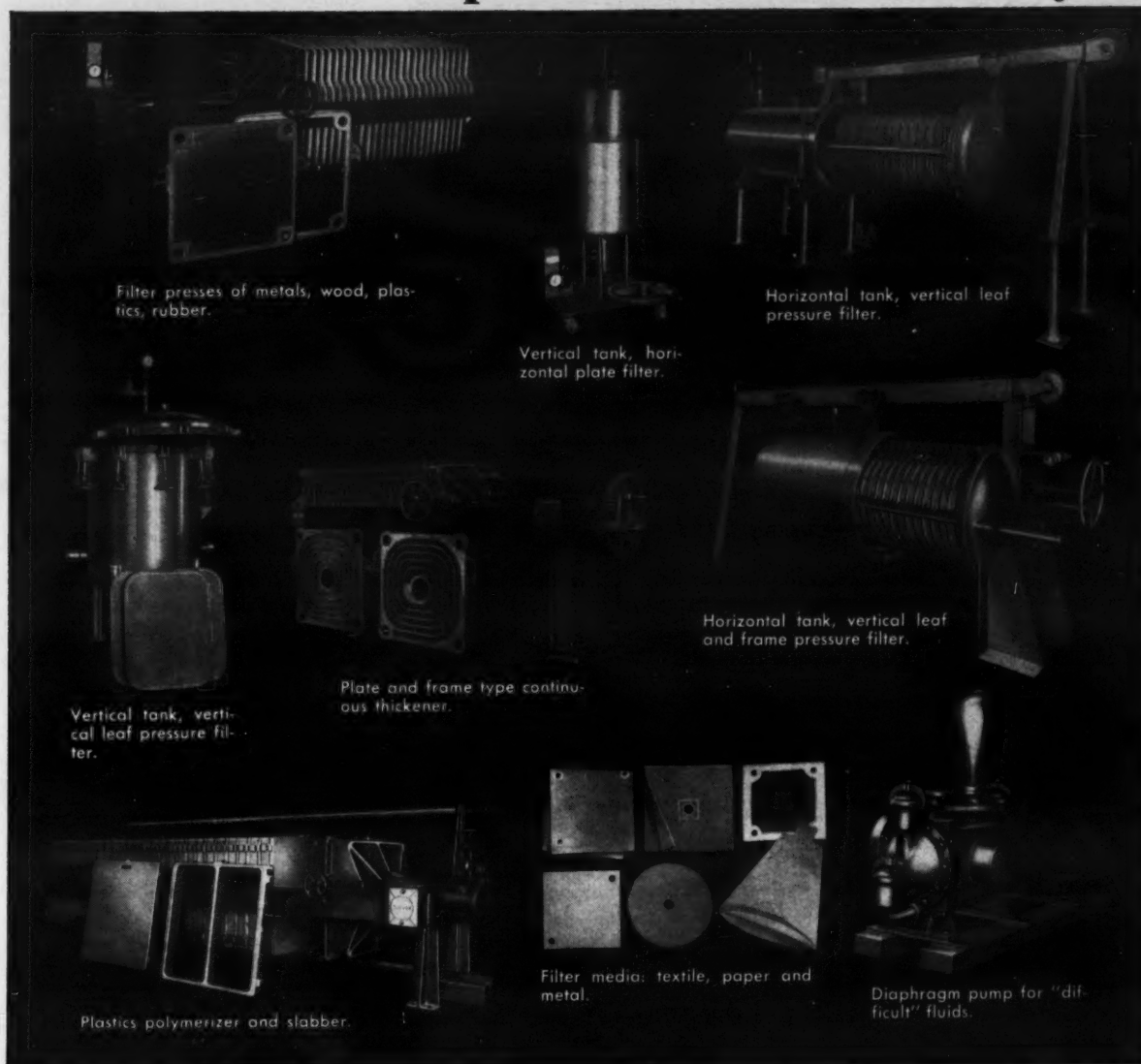
Self-cleaning pulleys are covered in booklet listing 3000 sizes. Pulley Cat — Van Gorp Mfg., Inc., Pella, Iowa.

Check 2081 opposite last page.



"Try another valve. We'll see what it is."

# These Shriver products work for you



One hundred years of service to American industry spotlights these among the many products Shriver has contributed to improved processing and more economical operation.

Pressure filters in several types from small laboratory size to large scale production units for almost every conceivable material from aspirin to alum, salts to sugar, vinegar to viscose . . . continuous thickeners for faster washing, thickening or leaching . . . plastics polymerizers and wax coolers and slabbers . . . filter media of all kinds . . . oxygen-hydrogen generators . . . diaphragm pumps

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Check 2082 opposite last page.



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**the  
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Check 2083 opposite last page.

## NEW LITERATURE

**Vinyl-acrylic copolymer solution**, for flexible film laminations and pressure-sensitive adhesive formulations, is covered in Resyn 26-2404 Bul — Resin Division, National Starch and Chemical Corporation, 750 Third Ave., New York 17, New York.

Check 2084 opposite last page.

**Sight glasses** for pressures to 300 psi, in range of sizes for all applications, are specified in Bul EB-20 — Corning Glass Works, 15 Crystal St., Corning, N.Y.

Check 2085 opposite last page.

**Air classifier** permits humidity control, drying, blending, coating, and controlled chemical reactions to be carried out simultaneously with classification. Details are given in Air Classifier Bul—Majac, Inc., 23rd St., Sharpsburg, Pittsburgh 15, Pa.

Check 2086 opposite last page.

**Tube expanders** (88) and tube cleaners (77) are the subjects of Cats 77 and 88 — Thomas C. Wilson, Inc., 21-11 44th Ave., Long Island City 1, N.Y.

Check 2087 opposite last page.

**One-man hinged closures** are depicted in four-page brochure which includes specifications and drawings. Hinged Closures Brochure—Tube Turns, Division of Chemetron Corporation, Box 43, Louisville, Ky.

Check 2088 opposite last page.

**Spray nozzles** in wide range of types and sizes are reviewed in a catalog which includes general spraying coverage data. "Spraco Nozzles" — Spray Engineering Company, 105 Cambridge St., Burlington, Mass.

Check 2089 opposite last page.

**Flexible valves** are treated in Buls FL-1116R and FL-935 — Farris Flexible Valve Corp., 505 Commercial Ave., Palisades Park, N.J.

Check 2090 opposite last page.

**Polypropylene** said by manufacturer to be lightest commercial plastic available is described in four-page preliminary technical data bulletin. "This Is Polypropylene" — Avisun Corporation, 1608 Walnut St., Philadelphia 3, Pa.

Check 2091 opposite last page.

**Liquid-level controls** are reviewed in Level Master Bul—Jo-Bell Products, Inc., 5456 W. 111th St., Oak Lawn, Ill.

Check 2092 opposite last page.

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Check 2093 opposite last page.

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A-5917-C

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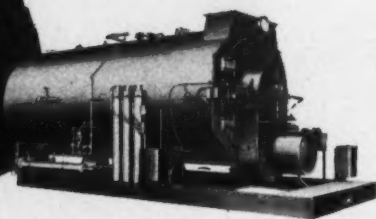
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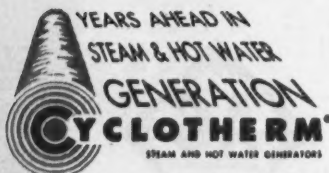
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Check 2095 opposite last page.

## NEW LITERATURE

**Centrifugal pump** which has all wetted parts fabricated of polyvinyl chloride, is introduced in All-PVC Pump Bul — Vanton Pump & Equipment Corp., division of Cooper Alloy Corp., Hillside, N.J.

Check 2096 opposite last page.

**Dewar flasks**, both stock and possible variations, are cataloged in 54-page Dewar Flasks Bul—H.S. Martin & Son, 1916 Greenleaf St., Evanston, Ill.

Check 2097 opposite last page.

**Conveyor elevators**, including centrifugal- and continuous-discharge models, are reviewed in Conveyor Elevator Cats — The Bucket Elevator Co., 57 Union Pl., Summit, N.J.

Check 2098 opposite last page.

**Infrared heaters** and controls are treated in eight-page catalog which includes diagrams and photographs. Cat G-62—Edwin L. Wiegand Company, 7500 Thomas Blvd., Pittsburgh 8, Pa.

Check 2099 opposite last page.

**Ball valves** of double-seal design, available in pipe sizes of  $\frac{1}{4}$  to 8" in variety of materials, are depicted in Ball Valve Literature — Jamesbury Corp., 65 New St., Worcester, Mass.

Check 2100 opposite last page.

**Low temperature chemistry** developments and application of equipment in this field are covered in liberally illustrated 44-page book "Liquid Helium Research Dewars"—Hofman Laboratories, Inc., 5 Evans Terminal, Hillside, N. J.

Check 2101 opposite last page.

**Heat-transfer cement**, which is non-metallic adhesive compound, is delineated in Therman Tech Literature — Therman Manufacturing Co., 1017 Rosine, Box 1961, Houston Tex.

Check 2102 opposite last page.

**Piston packings** of all-Nylon composition, available in various sizes, types, and textures, are outlined in Bul 5903 — Darling Valve & Manufacturing Co., Williamsport 4, Pennsylvania

Check 2103 opposite last page.

**Density control system** for dissolving tanks is reviewed in two-page Engineering Data Sheet 260-1 — The Foxboro Company, Foxboro, Mass.

Check 2104 opposite last page.

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STAINLESS STEEL

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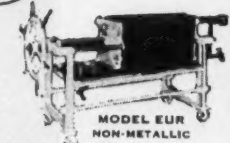
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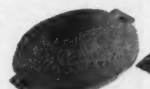
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A-1190-C



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*supplies small quantities  
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### NEW BUDGET DRYER IS IDEAL FOR :

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Check 2107 opposite last page.

### NEW LITERATURE

**Radioactivity monitoring systems** are described in 16-page bulletin. Featured is new system that solves natural radon progeny problem by providing direct identification of long half-life emitters almost immediately, with a single detector. Bul M-59 — Nuclear Measurements Corp., 2460 North Arlington Ave., Indianapolis 18, Ind.

Check 2108 opposite last page.

**Processing equipment**, fabricated to resist corrosion, is illustrated and specified in individual bulletins on plain and jacketed kettles, processing and storage tanks, agitators and accessories, and vacuum and pressure equipment. Processing Equipment Buls—Lee Metal Products Company, Inc., 418 Pine St., Philipsburg, Pa.

Check 2109 opposite last page.

**Drainer conveyor** for conveying and dewatering wood chips, defibered pumpable stock, or similar materials is detailed in two-page Bul P-29—The Bauer Bros. Co., 1728 Sheridan Ave., Springfield, Ohio.

Check 2110 opposite last page.

**Pressure vessels** and how they are made are subjects of four-page brochure. "Pressure Vessels"—Solar Chicago Division, U. S. Industries, Inc., 6400 W. 66th St., Chicago 38, Ill.

Check 2111 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

**Heat transfer equipment** is described in four-page booklet Bul 593—Brown Fintube Co., 300 Huron St., Elyria, Ohio.

Check 2112 opposite last page.

**Wire cloth** is subject of Bul 10—The Cleveland Wire Cloth & Mfg. Co., 3577 E. 78th St., Cleveland 6, Ohio.

Check 2113 opposite last page.

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CHEMICAL PROCESSING

## NEW LITERATURE

Canadian trends in pulp and paper industry are subject of eight-page reprint. Report includes outlook for products and chemicals used, new technology, research and development, and job opportunities. "Trends in the Pulp and Paper Industry" — The Chemical Institute of Canada, 18 Rideau St., Ottawa 2, Ontario, Canada.

Check 2115 opposite last page.

Gamma radiation measuring systems for density or specific gravity and liquid level control are described in six-page Bul 105-C—The Ohmart Corporation, 2236 Bogen St., Cincinnati 22, Ohio.

Check 2116 opposite last page.

Liquid pressure nitriding process for case hardening steel parts to make them resistant to spalling and softening at high temperatures is described in 18-page bulletin. Graphs are included showing relationships of case depths and hardness versus time in salt bath furnace. Bul 204—The A. F. Holden Company, 14341 Schaefer Highway, Detroit 27, Mich.

Check 2117 opposite last page.

Specifying sieves—factors to consider and suggested methods to follow—is the subject of technical article reprinted in eight-page Bul I-42—Sprout, Waldron & Co., Inc., 130 Logan St., Muncy, Pa.

Check 2118 opposite last page.

Ball valves which serve as both valve and union are delineated in Bul EB 101—Worcester Valve Co., Inc., 16 Parker St., Worcester, Mass.

Check 2119 opposite last page.

Turbocharged compressors are treated in 12-page bulletin which gives construction details on 9¾" bore by 10½" stroke V-angle compressor units for pumping services from 440 to 1100 hp. Bul 90—The Cooper-Bessemer Corporation, Mt. Vernon, Ohio.

Check 2120 opposite last page.

Water-treating equipment is expanded upon in 24-page Bul 615 — Elgin Softener Corporation, 180 N. Grove Ave., Elgin, Ill.

Check 2121 opposite last page.

## SAFE-SURE Liquid Level Control by LEVEL MASTER®

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Check 2122 opposite last page.

NOVEMBER 1959

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## **HAMER** *Visible Shut-off* **LINE BLIND VALVES**

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Will not stick or freeze. Perfect for hard-to-hold fluids.

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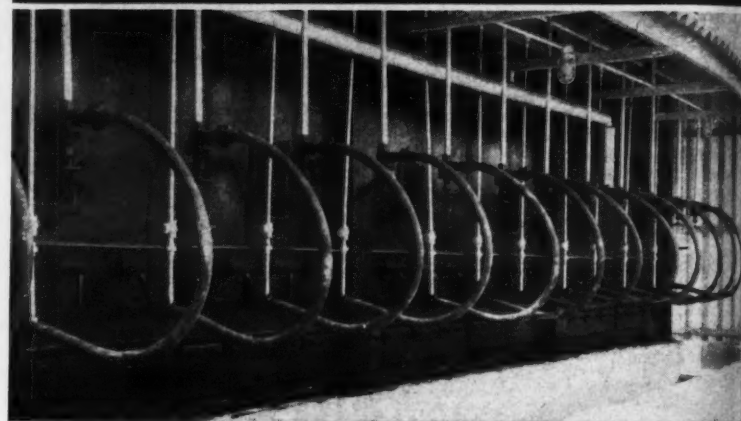
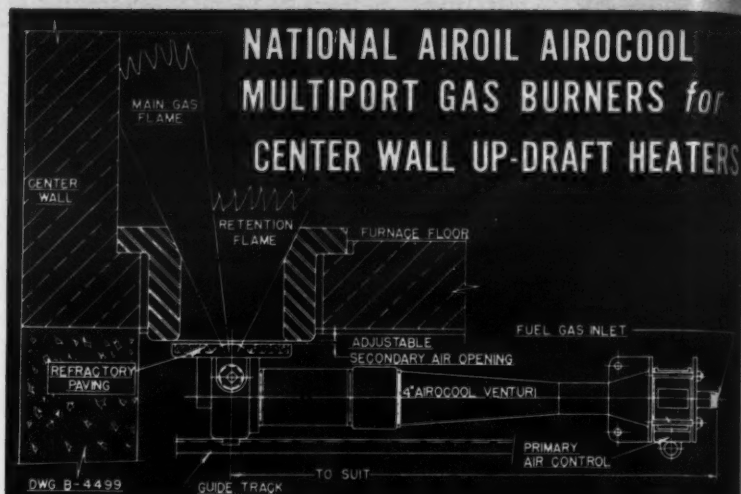
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Check 2124 opposite last page.



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- Nozzles that can be machined to direct the flame impact at 15°, or any other desired angle to produce the highest degree of heat transfer by radiation from the incandescent reflecting wall. They produce a short flame.
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Check 2125 opposite last page.

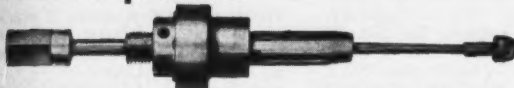
## Keep Heat Exchangers on the Line with **WILSON** Maintenance Tools

### Heavy-Duty TP-301 Cleaner



Positive air-driven, hollow rotary shaft, drill type tool. Tube is scavenged with air or water while cleaning.

### Tube Expanders



Wilson Models 41 and 44 Tube Expanders incorporate an improved, adjustable ball bearing thrust collar and are designed for efficient, easy rolling and maximum roll length adjustment for various tube sheet thicknesses.

### Torq-Air-Matic Expander Control



New Wilson Torq-Air-Matic is the first and only air-driven tube expander drive that accurately controls tube expansion by directly measuring torque output at the mandrel.

### Tube Cutter



Wilson tube cutter is easy to use and does a fast job. Cutter sizes and shanks available to meet all heat exchanger requirements.

Write today for your copies of Wilson Tube Cleaner catalog No. 77 and Wilson Tube Expander catalog No. 88.

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Cable address: "Tubeclean", New York

## **WILSON**

TUBE CLEANERS • TUBE EXPANDERS

Check 2126 opposite last page.

## NEW LITERATURE

Flexible connectors which combine corrosion, pressure and heat resistance with flexibility, are described in ALLFLEX Bul—Allied Metal Hose Company, 3784 Ninth St., Long Island City 1, N.Y.

Check 2127 opposite last page.

Sulfur trioxide, stabilized and in liquid form, is comprehensively covered in eight-page Sulfur Trioxide Bul—Industrial and Biochemicals Department, E. I. du Pont de Nemours & Co., Wilmington 98, Del.

Check 2128 opposite last page.

Pumps for hot or cold corrosive and slurry service are subject of bulletin which gives complete engineering data, parts lists and specifications. Pumps Bul—Dorr-Oliver, Inc., Stamford, Conn.

Check 2129 opposite last page.

Pipeline mixer that bypasses need for intermediate storage and mixing tanks is described in colorful four-page bulletin. Table of dimensions and motor sizes are also listed. Bul 531-A—Nettco Corporation, 81 Tileston St., Everett 49, Mass.

Check 2130 opposite last page.

Flow meters, feeders, and systems for handling materials in motion in the process industries are described in Bul B-I-F 5-1 — B-I-F Industries, Inc., 345 Harris Ave., Providence 1, R.I.

Check 2131 opposite last page.

Compressors, which have isolated cylinders that deliver air or gas free of oil or oily vapors, are reviewed in Bul 351 — Pennsylvania Pump and Compressor Co., Easton, Pennsylvania.

Check 2132 opposite last page.

Air-control units are described in Bul LA-15 — The Bellows Co., Division of International Basic Economy Corporation, Akron 9, Ohio.

Check 2133 opposite last page.

Ethylene oxide of improved quality and with new specifications is discussed in four-page bulletin available from Jefferson Chemical Company, Inc., 1121 Walker Ave., P. O. Box 303, Houston 1, Texas.

Check 2134 opposite last page.

Automatic fractionator that collects effluents by timed flow, volumetric, and drop count methods is featured in six-page folder "LKB Instruments"—Ivan Sorvall, Inc., Norwalk, Conn.

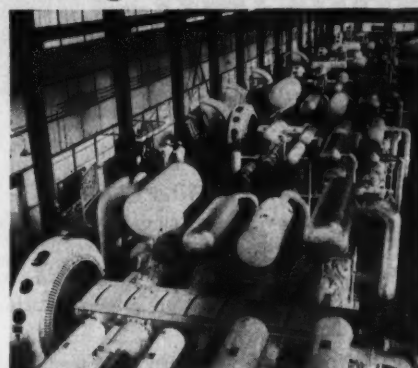
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## BURGESS-MANNING

### SNUBBER NEWS

Dedicated to the Elimination  
of Pulsation and Intake and Exhaust Noise

## Largest Installation of Burgess-Manning Pulsation Snubbers



The compressor room of the Petroleum Chemicals, Inc. Ammonia Plant, showing a few of the 98 snubbers installed in this plant.

## Protects Petroleum Chemicals, Inc. Ammonia Plant from Damaging Pulsation

Foster Wheeler Corporation was contracted by Petroleum Chemicals, Inc. to design and construct the multi-million dollar Ammonia Process Plant at Lake Charles, Louisiana.

Realizing from the start that gas pulsation would cause severe operational problems in multi-service process piping related to reciprocating compressors and that hazardous pulsation should be engineered out of the Plant in initial design, Foster Wheeler Corporation called upon the Burgess-Manning Company to develop Pulsation Snubbers for various service conditions and for installation under the original contract.

Ninety-eight Pulsation Snubbers of 46 individual designs were installed on multi-stage, multi-service compressors. These Snubbers were installed on both the suction and discharge side of the compressor cylinders in what is believed to be the largest single installation of Pulsation Snubbers under one roof.

The compressors handle various types of gases, ranging in molecular weight from 5.13 to 33 at pressures from atmospheric to

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- Hold the pulse amplitude to two per cent or less, total surge peak-to-peak, of absolute line pressure; and
- Hold to a minimum pressure drop requirement.

The snubbers were subjected to stringent specifications; i.e., material, workmanship and inspection procedures, normally followed by Foster Wheeler Corporation in process plants of this type. All forged snubbers for high pressure service were made of high tensile alloy steel, with internal assemblies engineered to withstand extreme forces.

After the plant went on stream, operational inspection revealed minimum pulsation-induced vibration, eliminating this operational hazard and constant maintenance, or upkeep of the laterals, headers, intercoolers and separators attendant to the snubbers.

If you are planning a new plant, or have a pulsation problem in your present plant, it will pay you to consult Burgess-Manning engineers.



**BURGESS-MANNING COMPANY**

Sound Engineering

Industrial Silencer Division

9231 Sovereign Row, Dallas 35, Texas  
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Check 2136 opposite last page.



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## MULTI-METAL FILTER MEDIA

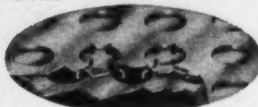
**Wire Cloth and Filter Cloth** in all alloys, and every degree of density down to 400 mesh and in all weaves.

**"Neva-Clog"** perforated sheet metal medium functions on edge filtration principle.

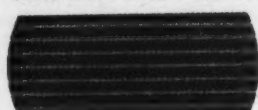
**"Micromesh"**—an ultrafine weave filter medium with a particle retention as low as 10 microns, made in corrosion-resisting alloys.



**"Multibraid"** (magnified); dense, strong, woven filter cloth.



**"Neva-Clog"** (magnified to show flow); perforated sheet metal filter medium.

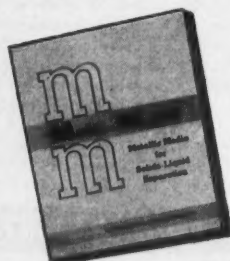


**"Micromesh"** (magnified) ultra-fine filter cloth; retention—25 to 10 microns.

## MULTI-METAL FABRICATIONS

A complete, comprehensive and versatile service in converting filter media into filtration or other processing components or complete units:

Filter leaves for all pressure and vacuum filters; screens for plate and frame presses; tubular filter elements; strainers; vibrating screens; baskets; hoppers; cylinders; elements for dryers, catalyst units, washers, mixers, etc., and complete apparatus or machinery.



Catalog 57 gives helpful, practical information on Multi-Metal research, engineering and product services for better methods and means of solids-liquid separation. Write for a free copy.

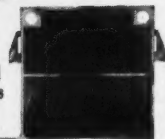
**"Rim-Lok"** leaf for vertical or horizontal filters.



**"Sweetland"** filter leaf.



**"Multi-Plate"** fabricated filter press plate.



Elements for gas stripping process.



Vibrating screen disc.



## MULTI-METAL WIRE CLOTH CO., INC.

1356 Garrison Ave., New York 59, N.Y.

Visit Booth 191, Chemical Exposition, Coliseum, New York

Check 2137 opposite last page.

## NEW LITERATURE

Chemical analysis equipment for continuous determination of cyanide concentration in liquids or gases is reviewed in two-page methodology sheet "AutoAnalyzer® Methodology"—Technicon Controls, Inc., Chauncey, N. Y.

Check 2138 opposite last page.

Design, engineering, and construction services available to the petroleum, chemical, gas, and power industries are described in 36-page brochure "Profitable Facilities Through Good Financial Design"—J. F. Pritchard & Co., 4625 Roanoke Pkwy., Kansas City 12, Missouri.

Check 2139 opposite last page.

Caustic potash — its properties, solutions, and safe methods of handling — is detailed in 60-page booklet. Suggested ways for safe handling are based on company's own research, field experience, and accepted sources. Bul No. 15 — Advertising and Sales Promotion Section, Solvay Process Division, Allied Chemical Corporation, 61 Broadway, New York 6, New York.

Check 2140 opposite last page.

SO, technical handbook gives comprehensive coverage to important aspects of this useful material. Reviewed in this spiral-bound, 42-page manual are: uses, properties, specifications and analysis, packaging and shipping, and health and safety aspects. Numerous charts, tables, and drawings are included. Sulfur Dioxide Technical Handbook may be obtained by letterhead request to the Tennessee Corporation, 617-29 Grant Bldg., Atlanta 1, Ga.

Gasket cutter, which uses ironing principle to hold material flat during sweep of cut and prevents buckling and tearing, is among items covered by Packing Cat — The Allpax Company, Inc., 160 Jefferson Avenue, Mamaroneck, New York.

Check 2141 opposite last page.

Plastic gate valve, which is available in PVC, Kralastic, or Penton construction, is presented in Plastic Gate Valve Literature — Vanton Pump & Equipment Corp., Division of Cooper Alloy Corp., Hillside, N.J.

Check 2142 opposite last page.



## ALL-JACKETED Gate Valves

for hard-to-handle viscous materials



Replaceable-in-line seat minimize shut-down time.

Valves-in-line size 1½" thru 4" are cast, size 6" and over are welded. Available in all metals.

## FOR BETTER FLOW CONTROL AND LONGER VALVE LIFE

● H&B jacketed equipment is completely jacketed—a pipe within a pipe—a valve within a valve—a fitting within a fitting. The double wall provides ample area for the heating or cooling medium to circulate. See our ad in Chemical Engineering or Refinery Catalog for further information on our complete line of jacketed processing equipment. Or write for Bulletin J-57.

HETHERINGTON & BERNER INC., 701 Kentucky Ave., Indianapolis 7, Ind.

Check 2143 opposite last page.

CHEMICAL PROCESSING



## NEW LITERATURE

**Filtration** is considered in Filter Data—Dept. CPF-1159, Filtration Engineers Division, American Machine and Metals, Inc., East Moline, Ill.

Check 2144 opposite last page.

**Disc-type filter** for continuous de-watering in chemical and allied industries is described in two-color, eight-page bulletin. Included are drawings and photographs of the filter, its components, and typical operating installations. Bul 7202—Dorr-Oliver Incorporated, 77 Havemeyer Lane, Stamford, Conn.

Check 2145 opposite last page.

**Air dryers** which supply small quantities of dry air at low cost are described in Bul B6A—Pittsburgh Lector-dryer Division, McGraw-Edison Company, 352 32nd St., Pittsburgh 30, Pa.

Check 2146 opposite last page.

**Valved couplings** for variety of applications are featured in Cat 58—Snap-Tite, Union City 6, Pa.

Check 2147 opposite last page.

**Material-handling equipment** — manufacturer's full line — is illustrated and described in condensed 68-page catalog. Included are vibrators, car shakers, packers and jolters, hopper-level switches, flow-control valves, feeders, conveyors, elevators, vibrating screens. Cat 596 — Syntro Company, 110 Lexington Ave., Homer City, Pa.

Check 2148 opposite last page.

**Aluminum** is subject of two bulletins which deal with process industries' applications of the metal (10460) and designing to prevent corrosion (20935). Buls 10460 and 20935 — Aluminum Company of America, 872-L Alcoa Bldg., Pittsburgh 19, Pa.

Check 2149 opposite last page.

**Temperature controls** which include 19 different midsize and miniature units are described in four-page brochure. Also reviewed is a hermetically sealed control which has contacts set to open on temperature rise. Bul MC-182 — Fenwal Incorporated, Pleasant St., Ashland, Mass.

Check 2150 opposite last page.

## where there's a drying operation leading manufacturers\* insist on **DUSTEX** **COLLECTORS**

DUSTEX miniature cyclone tubes, cast of white iron, provide an ultra-hard, cling-free, self-cleaning surface to assure maximum material recovery at a constant, high-speed rate.

DUSTEX patented design prevents condensation within the collector when inlet temperature is above the dew point. Handles temperatures up to 800°F. There are no filters to clog, no sludge to pump. It's virtually maintenance free!

**LOW INSTALLATION COST** and up to 99.8% efficiency make DUSTEX the perfect collector for spray dryer, rotary dryer or flash dryer processes.

\*Name on request

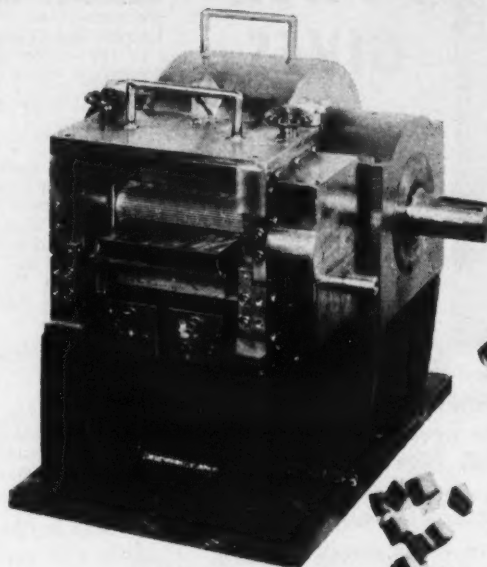
Write today for this free bulletin on the new D-584 DUST COLLECTOR.

P.O. BOX 2520, BUFFALO 25, N. Y.

**Dustex Corp.**

Check 2151 opposite last page.

## CUT UP TO 20 TONS PER HOUR OF UNIFORM PLASTIC PELLETS



Taylor-Stiles 700 Series Plastic Pelletizers cut up to 10 to 20 tons of pellets per hour without fines or longs. They require a minimum of maintenance and in general knife sharpening costs are very low.

These advantages spell lower costs for cutting per ton, a more saleable product. The absence of fines and longs assures better extrusions and moldings.

These advantages are due to Taylor-Stiles shear cutting design, which applies maximum power at the cutting point, gives cleanly cut, uniform pellets, reduces knife wear.

We make a wide range of plastic pelletizers with capacities from several hundred pounds up to 20 tons an hour. These machines cut rod or sheet stock (first cutting it into strips and then cross cutting the strips into pellets.) Thickness of material handled is up to 1/4".

The fact that many of America's leading producers of plastics use these machines, reorder them again and again, and have replaced other types with Taylor-Stiles is a good indication of their superior performance and economy.

Why be satisfied with lower output or, incur unnecessarily high power and maintenance and knife sharpening costs? Why have a less attractive product due to fines and longs. Why not have a Taylor-Stiles Pelletizer and avoid these and other difficulties?

Get all the facts? Write today for folders 213 and 217.

**TAYLOR, STILES & CO.**  
20 Bridge Street, Riegelsville, N.J.

Check 2152 opposite last page.



## POWER GIVES the PUSH!

The new MUNSON  
ELECTRO-MATIC  
SHOVEL unloads

three freight cars while hand-shoveling unloads one. Power gives the push—manual labor is reduced to positioning and guiding the scoop. Ideal for in-plant handling of bulk materials from bins and silos. Simplified, direct, electric control; with "Dead Man's" push-button for absolute safety. Free labor for other work . . . end loading-platform bottlenecks . . . triple unloading speed. For full information, write Munson.

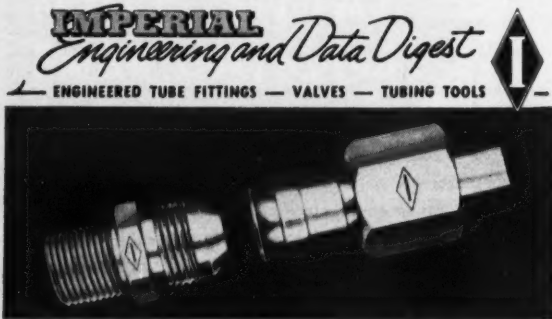
### MUNSON MILL MACHINERY CO.

A Division of Divine Brothers Company

200 Seward Ave. • Utica 1, N. Y.

Dry Mixers • Blenders • Hammer Mills • Attrition Mills • Rotary Knife  
Cutters • Steel Elevator Heads, Leggings, Boots • Electro-Matic Shovel

Check 2153 opposite last page.



### 37° FLARED FITTINGS BY IMPERIAL

Provided in steel, stainless steel and brass  
meet all Codes for Pressure Piping including A.S.M.E.

Imperial 37° flared tube fittings offer all the quality extras for which Imperial fittings are famous. They withstand high pressures and temperatures, vibration, corrosion and tensile pull — stay leak-proof. Steam tracer lines, process lines, turbines, pumps, compressors, blowers — just a few of the jobs Imperial J.I.C. 37° flared fittings find in chemical plants.

Specify Imperial — the first name in fluid transmission components!

Send for Bulletin No. 3077

THE IMPERIAL BRASS MFG. CO.

Dept. CPR-119

**IMPERIAL**

6300 W. Howard St., Chicago 48, Ill.  
In Canada: 18 Hook Ave., Toronto, Ont.

Check 2154 opposite last page.

### NEW LITERATURE

Small-diameter tubing in diameters from 1/8 to 1" and variety of tempers and finishes is itemized in Cat 102—Greenville Tubes, Inc., Greenville, Pa.

Check 2155 opposite last page.

Air-vibrator applications are detailed in four-page bulletin. Units are shown operating successfully in hazardous atmospheres, extreme moisture conditions, and magnetic dust conditions. Cat 303—The National Air Vibrator Company, 435 Literary Rd., Cleveland 13, Ohio.

Check 2156 opposite last page.

Preamplifiers for use with scintillation, proportional counter, or GM tube detectors are covered in two-page brochure Form 3023-9 — The Victoreen Instrument Company, 5806 Hough Ave., Cleveland 3, Ohio.

Check 2157 opposite last page.

Centrifugal pumps for corrosive service, which feature Type 20 stainless steel throughout, are reviewed in Bul CT-859 — Eco Engineering Company, 12 New York Ave., Newark 1, N. J.

Check 2158 opposite last page.

Roof ventilators with built-in protection against rain, snow, and sleet are delineated in Bul 680—Propellair, division of Robbins & Myers, Inc., Springfield, Ohio.

Check 2159 opposite last page.

Universal clamps' uses, in constructing industrial fixtures from ordinary pipe, are outlined in detail in 10-page booklet, "A World of New Uses for Pipe in Industry"—Tube-Strut Corp., 2960 Marsh St., Los Angeles 39, Calif.

Check 2160 opposite last page.

Filter assemblies are described in four-page bulletin, including detailed descriptions and dimensions of 66 filters. Bul A-1081 — Aircraft Porous Media, Inc., Subsidiary of Pall Corporation, 30 Sea Cliff Ave., Glen Cove, N. Y.

Check 2161 opposite last page.

Converting metallic sodium into wire is described in eight-page data sheet. Process and equipment descriptions are included. "Laboratory Production and Use of Sodium Wire" — U.S. Industrial Chemicals Co., Division of National Distillers and Chemical Corporation, 99 Park Avenue, New York 16, N. Y.

Check 2162 opposite last page.

## Accurate Flow Control of Viscous Fluids

### New Jacketed Diaphragm Control Valves



... apply heat uniformly throughout the valve from flange to flange and up to the stuffing box.

Valve will operate in response to control air from any standard 3-15 # range pneumatic controller. Diaphragm operators for 6-30 # ranges are available.

Bodies are semi-steel, Ductile Iron, steel or stainless steel to suit application.

Sizes range from 1 1/4" to 4". Larger sizes on application. For complete details and dimensions write for supplement catalog 356-S.



**Parks-Cramer Co.**

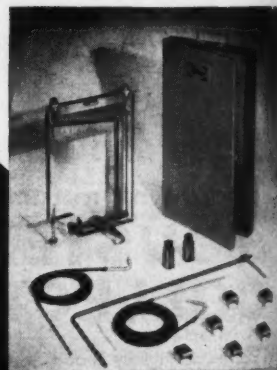
PROCESS HEATING DEPARTMENT  
FITCHBURG 12, MASSACHUSETTS

Check 2163 opposite last page.



## AIR VELOCITY METER No. 400

One  
Instrument  
Tells Both  
Air Velocity and  
Static  
Pressure!



Reads directly in feet per minute and inches of water.  
Check all velocities from 400 to 10,000 F.P.M.  
All static pressures from 0 to 10" of water.

Tests fan and blower discharge and inlet pressures, pressure drop across filters, balances air conditioning systems, etc. Complete kit includes dual purpose manometer, 18" stainless steel pitot tube, Magneclips and all necessary fittings, tubings, instructions and accessories.

Write today for literature and prices.

**F. W. DWYER MFG. CO.**

P.O. BOX 373-CP

MICHIGAN CITY, INDIANA

Check 2164 opposite last page.

CHEMICAL PROCESSING



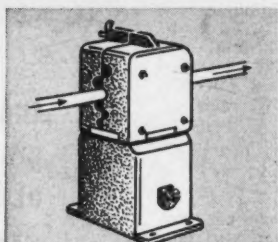


Possible  
only  
with  
a

## SIGMAMOTOR PUMP

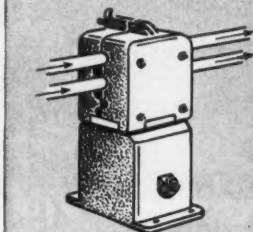
### Move Corrosive Liquids

Material being pumped never comes in contact with pump mechanism. Wave-like motion of steel fingers forces material through Tygon tubing. By changing size of tubing, capacity can be increased or decreased. Pump housing opens for removal and insertion of tubing.



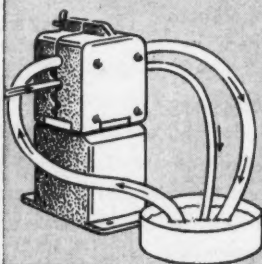
### Pump 2 or 3 Different Liquids Simultaneously

Some models will accommodate up to four tubes so that four different liquids can be passed through the pump at one time without danger of contamination.



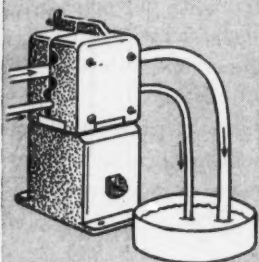
### Feed and Mix

One or more tubes can be feeding material to a mix while a larger tube is recirculating the liquid to produce agitation and thorough mixing. Viscous materials can be pumped without danger of gumming or plugging. Remove tube and pump is clean.



### Meter Additives

One or more additives can be pumped to a solution in the exact amount desired by selecting the correct size of tubing and regulating pump speed. Various controls can be incorporated to close valves ahead of pump.



Capacities from 0.5 cc. per min. to 4.5 G.P.M.

Write for complete information on sizes and capacities.

**SIGMAMOTOR, INC.**

18 N. Main Street

Middleport, N. Y.

Check 2165 opposite last page.

## NEW LITERATURE

**Non-corrosive pipe** as a solution to contamination, corrosion and weight problems is considered in Bul 20—Fibercast Company, division of The Youngtown Sheet and Tube Company, Box 727, San Springs, Okla.

Check 2166 opposite last page.

**Metering pumps** of stainless steel for use in chemical and allied industries are reviewed in selection manual and catalog, copy of which may be obtained from Mechanical Products Corporation, 1716 West Hubbard St., Chicago 22, Illinois.

Check 2167 opposite last page.

**Blister-forming attachments** for packaging in thermoplastic films is subject of data sheet. Formed parts come out in a continuous strip while machine is unattended. "Pak-O-Vac Blister Attachment"—Product Packaging Engineering, 5713 Joanne Pl., Culver City, Calif.

Check 2168 opposite last page.

**Immersion-heater-selection** information, for water, alkaline, or plating-bath heating, is contained on single-sheet Bul GEA-6305A—General Electric Company, Schenectady 5, N.Y.

Check 2169 opposite last page.

**Stationary air compressor** is depicted in 24-page bulletin, which incorporates specifications, diagrams, cross-section drawings, and installation photographs. Bul A-62—Joy Manufacturing Company, Oliver Bldg., Pittsburgh 22, Pa.

Check 2170 opposite last page.

**Centralized lubrication systems** which are automatic are expanded upon in Accumatic Cat — Dept. K-119, Stewart-Warner Corporation, 1850 Diversey Pkwy., Chicago 14, Ill.

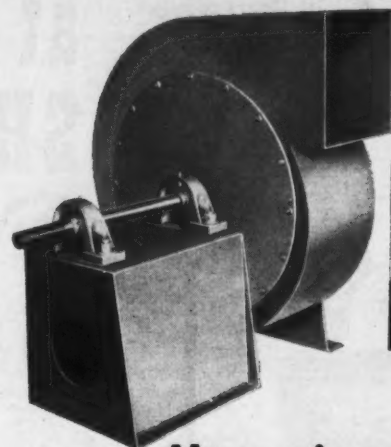
Check 2171 opposite last page.

**Specific gravity indicators** used for continuous measurement of liquid specific gravity are described in two-page bulletin. Bul 18S — Schutte and Koerting Company, Cornwells Heights, Bucks County, Pennsylvania.

Check 2172 opposite last page.

**Nickel-containing casting alloys** are detailed in 27-page booklet containing data on range of properties offered, industries served, and general applications. Bul A-260—The International Nickel Company, Inc., 67 Wall St., New York 5, N. Y.

Check 2173 opposite last page.



Move air and  
material at low cost!

**GARDEN CITY**

## RF INDUSTRIAL FANS

Available in  
Corrosion Resistant Construction

Tell us WHAT corrosives in gases, fumes or vapors ... or dusts, other materials ... you must combat, and we can give you a construction in a special metal, or a metal with a special coating, properly designed for your application. In order to utilize the most effective corrosive-resistant material for your needs, our engineers must have detailed information about your application.

Garden City Fan Company is a member of Air Moving and Conditioning Association, Inc.

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Send me complete information on your RF Industrial Fans. The fan I am interested in must be resistant to these corrosives:

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ESTABLISHED 1879

Representatives in leading cities  
801 North Eighth St., Dept. P, Niles, Michigan

Check 2174 opposite last page.





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### A GALIGHER ACID-PROOF SUMP PUMP

Available in standard or acid-proof construction. No seals, packing or submerged bearings. Sizes 1 1/4" - 6".

### B VACSEAL PUMP

A complete line of solids handling and acid pumps. Sizes 1 1/2" to 8".

### C GEARY-JENNINGS SAMPLER

Accurate, automatic samples of practically all types of materials.

### D GALIGHER DELTA\* AND SQUEEZE VALVE

Each designed for special conditions adapted to service in controlling the flow of abrasives in suspension, acids, and other corrosive materials.

### E AGITAIR® FLOTATION MACHINE

Renowned throughout the world for high recovery performance... low cost operation.

\*DELTA—Trademark of The Galigher Co.

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AP-504

Check 2175 opposite last page.

## NEW LITERATURE

Infrared absorption cells are discussed in a feature article in the first issue of company bulletin. "C.I.C. Newsletter" — Connecticut Instrument Corporation, Wilton, Connecticut.

Check 2176 opposite last page.

Pumping ideas and information on sizes and capacities of manufacturer's line of pumps are presented in Pump Bul—Sigmamotor, Inc., 18 N. Main St., Middleport, N.Y.

Check 2177 opposite last page.

Cementable Teflon linings, which will withstand 500°F with use of high-temperature adhesives, are detailed in Cat AD-158 — United States Gasket Plastics Division, The Garlock Packing Company, Palmyra, N. Y.

Check 2178 opposite last page.

Lubricated plug valves are covered in four-page Lubricated Plug Valve Bul — Homestead Valve Manufacturing Company, Coraopolis, Pa.

Check 2179 opposite last page.

## ARE YOU A CARTOONIST?

If so, you can recognize humorous incidents in chemical processing operations that can be turned into profits for you.

### CHEMICAL PROCESSING will pay:

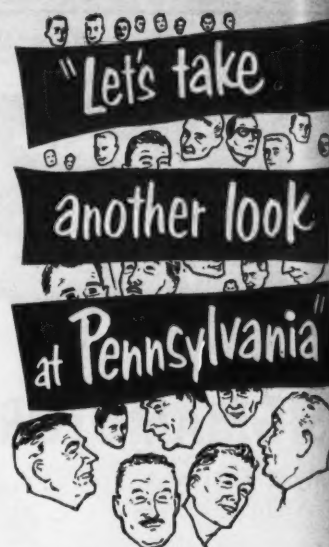
\$10 for black ink cartoons (with gag lines) on 8 1/2 x 11" sheets — ready to reproduce — payable on acceptance.

\$5 for cartoon ideas — written descriptions or rough sketches of scenes — and captions.

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Don't forget to include your name, address, and company affiliation.



...that's what a  
growing number  
of industrial  
executives are  
saying and doing!

For the three years—'56, '57 and '58 they announced:

**254** NEW PLANTS

**224** RE-OPENINGS  
OF IDLE PLANTS

**484** PLANT EXPANSIONS

(Send for the list—address below)

### They are finding:

Surplus of industry-minded workers... Strategic locations in the great Eastern market with access to major trunk line railroads, and modern highway and Turnpike networks... Ports on the Atlantic, St. Lawrence Seaway and Ohio River system... All types of industrial raw materials and components... 100% low-interest plant financing in labor surplus areas... Choice of industrial "parks" and individual plant sites.

### In Terms of Taxes:

- No state property tax
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- Low local property taxes
- No tax on machinery or inventories

For free copy of "Plant Location Services" pamphlet, or for details on 100% financing, write or call:



Pennsylvania Department of Commerce

Pennsylvania Department of Commerce  
South Office Building  
557 State Street, Harrisburg, Pa.  
Phone: CEdar 4-2912

Check 2180 opposite last page.

CHEMICAL PROCESSING

## Efficient screening cuts costs, ups sales



SWECO SEPARATOR removes oversize plastic pellets at 6,000 lbs./hr. at Cooke Color & Chemical Company, Hackettstown, N. J.

Cooke Color & Chemical Company needed to screen out oversize plastic pieces from diced polyethylene stock to prevent clogging of filling machines and insure uniform size pellets which customers could use without rescreening. A 48" diameter Sweco Separator was installed with two 3-mesh stainless steel screen cloths. All oversize material was effectively removed. Production down-time of the filling machines was eliminated. Cooke gained a competitive advantage in increased customer acceptance.

*If you have a screening problem, write for a test demonstration in your plant, on your own material. Or send for new 20-page catalog and screening data on your specific material.*

Write Dept. S-304-3

**SWECO** Southwestern Engineering Company  
4800 Santa Fe Avenue, Los Angeles 58, California  
Engineers—Constructors—Manufacturers

See SWECO Separators and new Vibro-Energy Mills  
in operation at Chem Show, New York Coliseum, Nov. 30-Dec. 4

Check 2181 opposite last page.

## NEW LITERATURE

**Laboratory equipment** used for general research, production and quality control, biochemistry, and clinical work is covered in 200-page Cat 1959-60—Cole Parmer Instrument and Equipment Company, 224 West Illinois St., Chicago 10, Ill.

Check 2182 opposite last page.

**Metering pumps** receive full treatment in Chemical Feeders Cat—Manzel, unit of Houdaille Industries, Inc., 274 Babcock St., Buffalo 10, N.Y.

Check 2183 opposite last page.

**Heat exchanger design** and applications are detailed in 20-page brochure Bul B-20—Struthers Wells Corporation, Warren, Pa.

Check 2184 opposite last page.

**Heavy liquids**—both aqueous and organic—are described in 11-page booklet which also contains a discussion of the higher range suspensions of mercury in a heavy liquid. "Heavy Liquids"—Engineered Materials, P. O. Box 363, Church Street Station, New York 8, New York.

Check 2185 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

**Industrial storage batteries** are basis of six-page handbook of technical instructions and engineering data on care of motive-power storage batteries. Bul GB-1896—Gould-National Batteries, Inc., Trenton 7, N.J.

Check 2186 opposite last page.

**Fatty alcohols** available in large tonnage are listed in data sheet which gives typical analyses of variety of compounds. Tech Data Sheet D20 — M. Michel and Company, Inc., 90 Broad St., New York 4, N.Y.

Check 2187 opposite last page.

**Electric-hoist selection guide** is featured in 34-page catalog. Dimensional drawings and detailed specifications are included for the low-headroom, ¼- to 12-ton-capacity units. Cat H-59 — American Engineering Company, Wheat-sheaf Lane and Sepviva St., Philadelphia 37, Pa.

Check 2188 opposite last page.

## ENGINEERING PERSPECTIVE THROUGH A

# VENTURI



*Venturi tubes were first used for measuring fluid flow. While this application has increased substantially, the use of the Venturi in important unit process operations has increased even more. A Jet-Venturi combination is literally the heart of many important manufacturing processes.*

**JET REFRIGERATION  
JET COMPRESSORS  
JET CONDENSERS  
JET HEATERS  
JET PUMPS  
JET MIXERS  
JET REACTORS  
JET ABSORBERS  
JET FUME SCRUBBERS  
SPECIAL JET VENTURI UNITS**

During the first several years of the forty-two year history of our firm, we specialized entirely on steam jet vacuum pumps (ejectors). Many thousands of these are in service throughout the country and in most foreign countries. Our tradename, EVACTOR, is an important word in engineering circles. While steam jet vacuum pumps are still our major item, other applications of Jet-Venturi equipment are increasing constantly. With the exception of closely related products such as barometric condensers, CHILL-VACTORS, and CONVACTOR\* systems, all of our activity is directed to the one purpose of making Jet-Venturi units more efficient, more dependable, more economical, and to apply them to an increasing number of industrial applications.

\*The CONVACTOR is a dual condensing system for economic and efficient recovery of high boiling components from water vapor.



**Croll-Reynolds CO., INC.**

Main Office: 751 Central Avenue, Westfield, N. J.

New York Office: 17 John Street, N. Y. 38, N. Y.

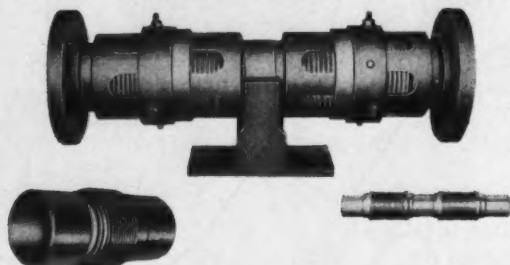
CHILL-VACTORS® • Steam-Jet EVACTORS® • Aqua-VACTORS® • Fume Scrubbers • Special Jet Apparatus

Check 2189 opposite last page.



# KEFLEX LAMINATED MULTI-PLY

## EXPANSION JOINTS of STAINLESS STEEL

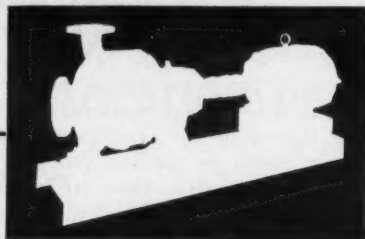


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Check 2191 opposite last page.

### NEW LITERATURE

Centrifugal pumps are described in 16-page brochure which contains technical data on their selection and operation. Cat PC-759—G & H Products Corporation, 5718 Fifty-second St., Kenosha, Wis.

Check 2192 opposite last page.

Power switching centers are reviewed in 20-page bulletin containing design information for use in selection and specification of 4.8- through 14.4-kilovolt equipment. Bul G-1616-A—I-T-E Circuit Breaker Company, 1900 Hamilton St., Philadelphia 30, Pa.

Check 2193 opposite last page.

Safety shut-off valve for remote-pump operation is introduced in four-page Bul F-47—OPW-Jordan, 6013 Wiehe Rd., Cincinnati 13, Ohio.

Check 2194 opposite last page.

Indicating controllers and self-balancing indicators are explained in four-page bulletin which includes description of potentiometer and bridge-type units and gives specifications for high-gain servo-amplifier. Bul 65—Thermo Electric Co., Inc., Saddle Brook, New Jersey.

Check 2195 opposite last page.

Heavy-duty checkweigher handles bags and boxes while in motion, within a weight range of 50 to 200 lb. Four-page folder describes features, shows it in action, and covers accessories. Form 2968—Toledo Scale, Division of Toledo Scale Corporation, Toledo 12, Ohio.

Check 2196 opposite last page.

Variable-speed pulleys are delineated in 12-page bulletin, giving technical data for five Type MS sheaves, designed for ratings of 2, 3, 5, 10, and 15 hp. Bul 4101—T. B. Wood's Sons Company, Chambersburg, Pa.

Check 2197 opposite last page.

Corrosion-resistant fastenings are the subject of an 88-page new edition of the "Net Price Catalog"—H. M. Harper Company, 8200 Lehigh Ave., Morton Grove, Ill.

Check 2198 opposite last page.

Electronic liquid level controller which is fully transistorized is described in four-page folder Specification S1017-1—Industrial Div., Minneapolis-Honeywell Regulator Company, Philadelphia 44, Pa.

Check 2199 opposite last page.

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# NEW LITERATURE

**Polychlorotrifluoroethylene** polymers are discussed in detail in 16-page bulletin complete with viscosity-temperature charts. Data presented include chemical inertness, physical properties, electrical properties, toxicity effects on construction materials. Halocarbon Bul—Halocarbon Products Corporation, 82 Burlews Ct., Hackensack, New Jersey.

Check 2203 opposite last page.

**Laboratory sterilizers** and other apparatus for industrial and biological research work are covered in 16-page Bul SC-318R—American Sterilizer Company, Erie, Pa.

Check 2204 opposite last page.

**Details of construction** and advantages of multipass shell-and-tube condensers are summarized in 12-page bulletin. Dimensions for various units are tabulated on three pages. Bul 232-J—Frick Company, Waynesboro, Pa.

Check 2205 opposite last page.

**Vertical impact mill** with integral air classifier is presented in single-sheet bulletin, including flow-sheet and operating information. Bul 093—Sturtevant Mill Company, Park & Clayton Streets, Boston 22, Mass.

Check 2206 opposite last page.

**Filter media** selection chart containing 12 pages is designed to help choose proper engineering materials and filter media for given types of corrosive conditions. PUR-66D — Purolator Products, Inc., Rahway, N. J.

Check 2207 opposite last page.

**Flat-top conveyor** for quiet movement of cans, bottles, and jars is specified in data sheet. Unit has continuous nylon track. "Silent-Top"—M-H Standard Corporation, 513-521 Communipaw Ave., Jersey City 4, N. J.

Check 2208 opposite last page.

**Laboratory demineralizer** is described in Bul 4553—The Permutit Company, Div. of Pfaudler Permutit, Inc., 50 West 44th St., New York 36, N. Y.

Check 2209 opposite last page.

**Hydrostatic-instrument** specifications, principles of use, selection, installation, and engineering data are presented in 88-page, pocket-size Petrometer Handbook—Petrometer Corporation, 43-22 Tenth St., Long Island 1, N.Y.

Check 2210 opposite last page.

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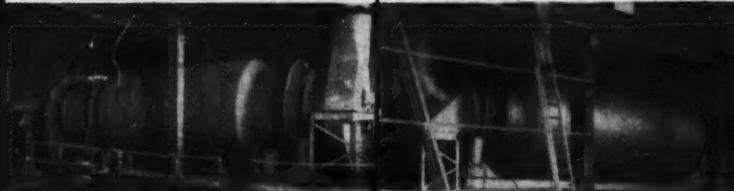
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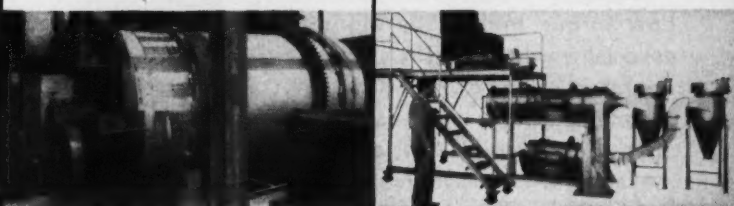
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Check 2211 opposite last page.

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Check 2212 opposite last page.

### NEW LITERATURE

**Pneumatic conveying** in the pulp and paper industry is discussed in 16-page bulletin. Twenty-two photographs and 14 line drawings depict specific installations and show various components of the systems. Five tables provide detailed specifications. Bul FF-26-2 — Fuller Company, Catasauqua, Pa.

Check 2213 opposite last page.

**Ram-type drain valves**, which are designed so that, in closed position, piston or ram extends up into tank to preclude clogging, are listed in Drain Valve Cat — Strahman Valves, Inc., Nicolet Ave., Florham Park, N.J.

Check 2214 opposite last page.

**Analytical ultracentrifuge** is described in 16-page brochure which contains complete outline of technical data. Bul SBE-3 — Beckman/Spinco Division, Beckman Instruments, Inc., Stanford Industrial Park, Palo Alto, Calif.

Check 2215 opposite last page.

**Rubber and elastomers** for industrial uses are summarized in four page Bul 881—La Favorite Rubber Manufacturing Company, Hawthorne, N. J.

Check 2216 opposite last page.

**Mixers**, made in size range of 3- to 300-gal capacities, are dealt with in Mixer Information — Paul O. Abbe Inc., 402 Center Ave., Little Falls, N.J.

Check 2217 opposite last page.

**Pump selection** is greatly simplified by use of 578-page catalog, in which performance curves, range charts, descriptions, dimensions, engineering data, and prices are contained for type of construction desired and material to be handled. Specification tables, drawings, photographs, and graphs are included in Pic-A-Pump Cat, which may be obtained by letterhead request to Allis-Chalmers Manufacturing Company, Box 512, Milwaukee 1, Wis.



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## NEW LITERATURE

**Filtration fact book** of over 80 pages describes wheres, whys, and hows of filters for removing sub-micron particles, foreign substances, and gases. Filtration handbook may be obtained by letterhead request to Flanders Filters Inc., P. O. Box 718, Riverhead, New York.

**Multiple tube**, of copper, aluminum or polyethylene, for pneumatic and hydraulic instruments and control, is featured in Bul 458-E — Crescent Insulated Wire & Cable Co., Trenton 5, N.J.

Check 2218 opposite last page.

**Control instruments** and all-electric combustion control systems are reviewed in eight-page condensed catalog Bul 59-C091 (297) — The Hays Corporation, Michigan City, Ind.

Check 2219 opposite last page.

**Dry dust collector** of centrifugal type is considered in eight-page bulletin which incorporates diagrams and schematic drawings to illustrate operation of unit. Bul 291A—Dept. PD, American Air Filter Company, Inc., 215 Central Ave., Louisville 8, Ky.

Check 2220 opposite last page.

**Rust preventive**, which is water-displacing, for use in long-term indoor storage is covered in folder "Rust Veto 377"—E. F. Houghton & Co., 303 West Lehigh Ave., Philadelphia 33, Pa.

Check 2221 opposite last page.

**Sugar-cane waxes** used as rubber processing aids are described in eight-page report. Test findings are presented in detailed tabular form. "Cane Wax Aids" — Warwick Wax Division, Western Petrochemical Corporation, 2 West 45th St., New York 36, N.Y.

Check 2222 opposite last page.

**Protective coatings color chart** showing chemical resistance of 21 colors in acid, alkali, oxidizing, and weathering environment are contained on two-page chart No. 5—Carboline Company, St. Louis 17, Missouri.

Check 2223 opposite last page.

**Live-storage racks** which offer a choice of either steel or low-cost plastic wheels are detailed in four-page bulletin. One page is devoted to tips in designing a rack installation for specific requirements. Versarack Bul—M-H Standard Corporation, 515 Communipaw Ave., Jersey City 4, N.J.

Check 2224 opposite last page.

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Check 2226 opposite last page.

## NEW LITERATURE

**Two process pumps** for petroleum industry are subject of eight-page bulletin, incorporating parts listing. Bul 724-1—Goulds Pumps, Inc., 59 Black Brook Rd., Seneca Falls, New York.

Check 2227 opposite last page.

**Centrifugal pumps** of both open- and closed-impeller types are reviewed in Bul 107 — Frederick Iron and Steel Inc., Frederick, Maryland.

Check 2228 opposite last page.

**Servo valves** which incorporate a mechanical feedback feature are presented in eight-page Cat 310—Moog Servocontrols, Inc., East Aurora, N.Y.

Check 2229 opposite last page.

**Container dumpers** are detailed in four-page illustrated catalog. Feature is handy selector chart to facilitate choosing the right equipment for handling loads to 5000 lb at dumping heights to 50'. "Cesco Dumpers"—Conveyors and Dumpers, Inc., PO Box 567, West Caldwell, N. J.

Check 2230 opposite last page.

**Conveyor**, which incorporates flexible non-metallic flights braced with steel plates, is shown in Folder 2813 — Link-Belt Company, Prudential Plaza, Chicago 1, Ill.

Check 2231 opposite last page.

**Zinc-filled inorganic coating** that becomes water insoluble 20 minutes after application is explained in Carbo Zinc 11 Bul — Carboline Company, 32-B Hanley Industrial Ct., St. Louis 17, Mo.

Check 2232 opposite last page.

**Positive-displacement meters** are discussed in detail in LC Meter Spec Sheets—Liquid Controls Corporation, North Chicago, Ill.

Check 2233 opposite last page.

**Centrifugals**, featuring slow-speed discharge of 35 rpm, are presented in Bul 2775 — The Western States Machine Company, 1702 Fairgrove Ave., Hamilton, Ohio.

Check 2234 opposite last page.

**Thermocouple assemblies**, where they're used and why, receive thorough treatment in 48-page technical bulletin compilation. Covered are heads, fittings, elements and wells. Cat 34-R — Thermo Electric Co., Inc., Saddle Brook, N.J.

Check 2235 opposite last page.

## NEW LITERATURE

**Dust collector** is delineated in D-584 Dust Collector Bul — Dustex Corp., Box 2520, Buffalo 25, N.Y. Check 2236 opposite last page.

**Line-blind valves** are covered in Valve Cat — Hamer Valves, Division of Chiksan Company, Box 1851, 2919 Gardenia Ave., Long Beach 1, Calif. Check 2237 opposite last page.

**Laboratory equipment** for mixing, grinding, and homogenizing — among other uses — is discussed in eight-page catalog. "Er-we-ka Method" — Chemical and Pharmaceutical Industry Co., Inc., 90 West Broadway, New York 7, New York. Check 2238 opposite last page.

**General-utility ejectors**, of single-stage type, for any vacuum service from 3" Hg absolute to atmosphere, are featured in four-page Form 9046—Ingersoll-Rand Co., 11 Broadway, New York 4, N.Y. Check 2239 opposite last page.

**Permanent-magnetic pulleys** for automatic removal of tramp iron or iron fines are depicted in Magnetic Pulley Literature — Eriez Mfg. Co., 73-YB Magnet Drive, Erie, Pa. Check 2240 opposite last page.

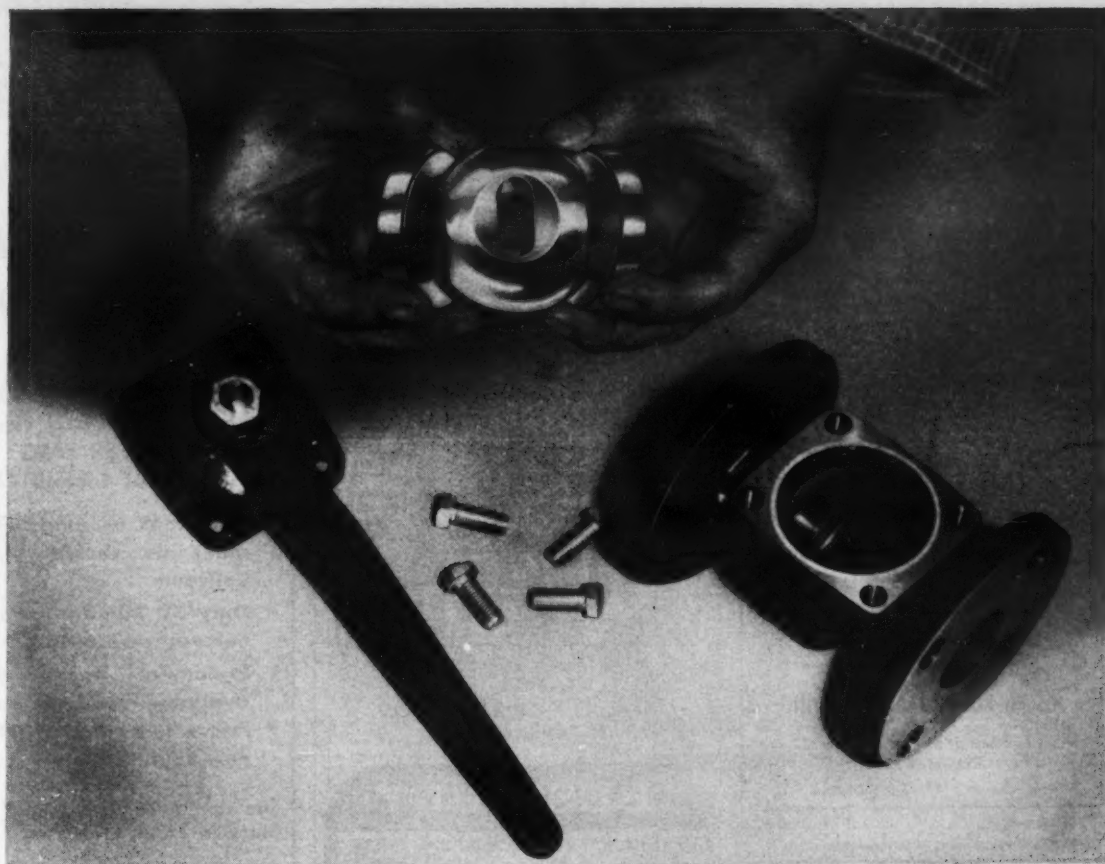
**Torque** is topic of 28-page manual, which discusses various types of torque wrenches and adapters and gives various torque formulas. Torque Manual — P. A. Sturtevant Co., Addison, Ill. Check 2241 opposite last page.

**Reactive and rate metals** — zirconium, titanium, tantalum, Hastelloy C, and stainless 316 tubing — are shown according to corrosion resistance to 43 commonly encountered chemicals in wall chart available from Damascus Tube Company, Greenville, Pa. Check 2242 opposite last page.

**Valves** are delineated in 190-page bulletin, including engineering charts and data, such as corrosion-resistant tables for 15 metals and over 400 corrosive media in various conditions. Bul A-155—Associated Valve Company, 337 W. Walnut St., North Wales, Pa. Check 2243 opposite last page.

**PVC pipe, fittings, flanges, valves** and specialties are treated in Cat 119 — Dept. CP-11, Tube Turns Plastics, Inc., 2929 Magazine St., Louisville 11, Ky. Check 2244 opposite last page.

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## NEW LITERATURE

**Geared flexible couplings**, which have torque-transmitting parts machined from cold-rolled steel, are considered in Folder 2875—Link-Belt Company, Prudential Plaza, Chicago 1, Ill.

Check 2246 opposite last page.

**Kiln, furnace control applications** are contained in four-page bulletin. Listed are pyrometers in controlling, recording, and indicating models; draft controllers and recorders, thermocouple and radiation sensing units. Bul DMO54—The Bristol Company, Waterbury 20, Connecticut.

Check 2247 opposite last page.

**Vibrating screens**, for range of 2 to 325 mesh (wet or dry) are detailed in Vibrating Screen Literature — Derrick Manufacturing Co., 591 Duke Rd., Buffalo 25, New York.

Check 2248 opposite last page.

**Textile finishing compounds** are described in a data file which serves as a permanent catalog. Data File Cat — Onyx Oil & Chemical Co., Jersey City, N.J.

Check 2249 opposite last page.

**Aluminum bronze alloys** used in stock products are described in illustrated four-page Bul G-51—Ampco Metal, Inc., 1745 South 38th St., Milwaukee 46, Wis.

Check 2250 opposite last page.

**Coal tar epoxy coatings** laboratory tests have been compiled in eight-page report to show what to expect when these materials are exposed to attack of various corrosive solutions and environments. Bul R-20—Amercoat Corporation, 4809 Firestone Blvd., South Gate, Calif.

Check 2251 opposite last page.

**Air separation formulas** are incorporated in Air Separation Booklet — Rubert M. Gay Division, Universal Road Machinery Co., 117 Liberty St., New York 6, N.Y.

Check 2252 opposite last page.

**Temperature transmitter** utilizing a helium gas-filled system is specified in four-page Spec P51-4 — Bailey Meter Company, 1050 Ivanhoe Road, Cleveland 10, Ohio.

Check 2253 opposite last page.

**Butterfly valves** are presented in eight-page brochure, including diagrams and specification tables. Bul 583—W. S. Rockwell Company, 200 Eliot St., Fairfield, Conn.

Check 2254 opposite last page.



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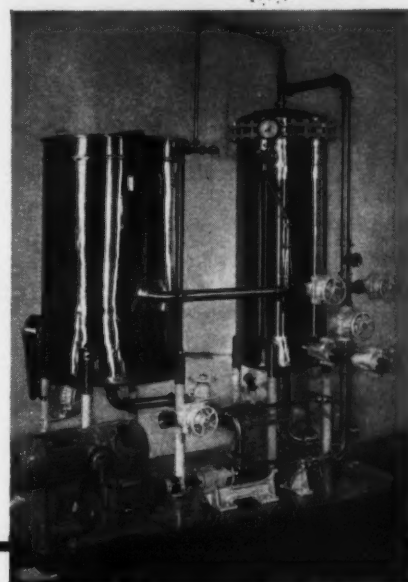
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## NEW CROLL-REYNOLDS CLARITE FILTER

speeds Liquid Lustre-Creme filtration, is easy to clean



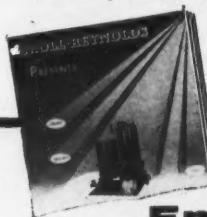
Mr. Joseph Mercadante,  
Project Engineer in Charge,  
Colgate-Palmolive Company

Existing Colgate-Palmolive filter units used to develop the new Liquid Lustre Creme product were found inadequate for regular production. Medium was very viscous, production requirements high. Starting with a basic ClaRite Filter, Croll-Reynolds engineered a filter capable of handling a viscosity of 900 cps or more, at a rate of about 500 gallons an hour.

*ClaRite Filter Station works quite simply:* A charge of diatomaceous earth and Liquid Lustre Creme is put into pre-coat tank (left), then recirculated through filter chamber (right). When filter membranes are fully precoated, the unit is put on stream. The variable speed, positive displacement pump shortens precoating time and makes filtration more efficient.

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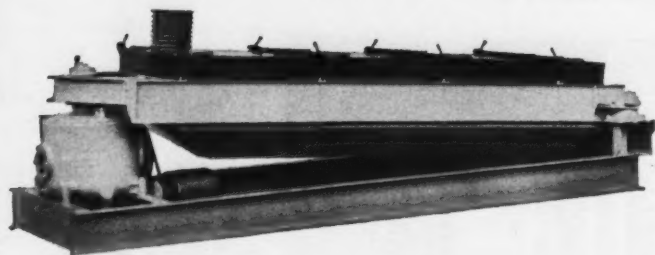
### Croll-Reynolds Engineering Co., Inc.

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Representatives in Principal Cities

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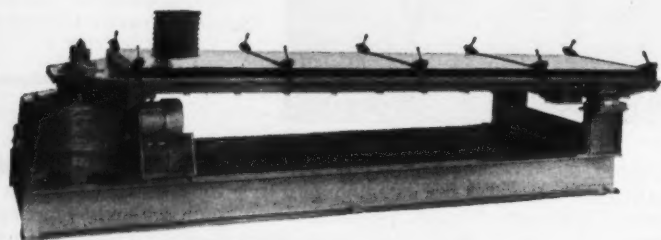
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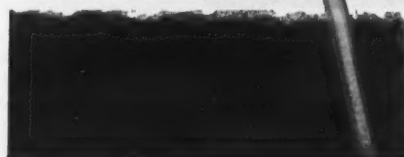
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Eastern designs and builds



positive displacement pumps • gear pumps • centrifugal pumps



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INDUSTRIES  
INCORPORATED**  
100 SKIFF STREET  
HAMDEN 14, CONN.



129 hydraulic pump and electric motor combinations are available off-the-shelf, for most applications. Outside this broad range, specific customer requirements can be met by drawing on Eastern's vast design resources.

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700 series — up to 9.8 G.P.M. — pressures to 1500 P.S.I.

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VIBRATION INDUCERS  
"WORLD'S QUIETEST VIBRATOR"

**MOVES, SIFTS,  
COMPACTS  
MATERIALS**

This vibration inducer has only one moving part—a rolling ball. Works perfectly on wet or dirty air. Needs no lubricator. Guaranteed self-starting always. Operates continuously in very hot locations. Absolutely spark-free for hazardous jobs.

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\*"Vibrolator" is Martin Engineering's registered trade mark for its vibration inducers and vibration accessories.

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155 Kemp St. Neponset, Illinois



Check 2258 opposite last page.

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CONCRETE FLOORS**

**TEST IT  
ON TRIAL  
OFFER**

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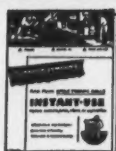
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Title .....  
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Check 2259 opposite last page.



that's interesting

Thought-provoking slants  
on projects and products

## 'Piggy-back' jet travel looms for tomorrow

Borrowing a page from the railroads' successful development of piggy-back freight movements, three specialists from General Applied Science Laboratories, Inc., West Hempstead, N. Y., predict tomorrow's jet passengers may travel in two-stage aircraft.

Here's how it would work: Passengers would board a small, light jet designed to operate at high speed and high altitude. It would be carried aloft by a "mother" plane. At a specified altitude, the mother plane would release its burden and return to base for another take-off. The "drone" would proceed to its destination.

## Pharmaceutical firm sows its own oats

Oat sprouts are essential to diet of guinea pigs used by Lakeside Laboratories, Inc. (Milwaukee) for experiments. Often these succulent tidbits are hard to come by. Technicians in the animal care section reportedly have mastered the technique of cultivating oats in the research laboratories, even in winter. Trays of oats are covered by wet burlap. Electric lamps provide heat. Voila! Guinea pigs have supper.

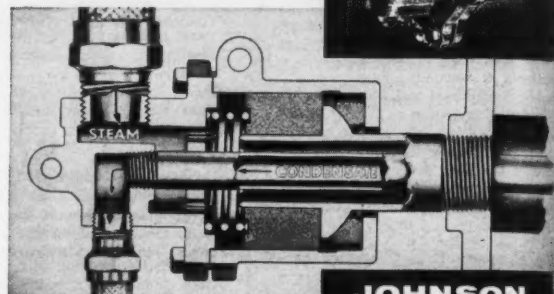
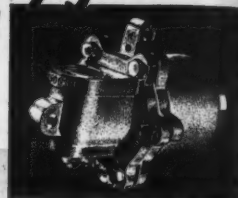
## Rubber binder in cement modernizes masonry art

A modern touch has been added to the Byzantine era art of installing glass mosaic tile.

A specially formulated liquid rubber replaces water as a binder in the cement with which these tiles are installed. It is said the tiny tiles can be set almost at the speed of floor tiles. One of big advantages is the fact water won't penetrate rubberized cement to loosen tiles or cause them to pop off.

# Need a rotary joint?

... for water-cooled  
or steam-heated  
rolls ...



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Rotary Pressure  
JOINTS**

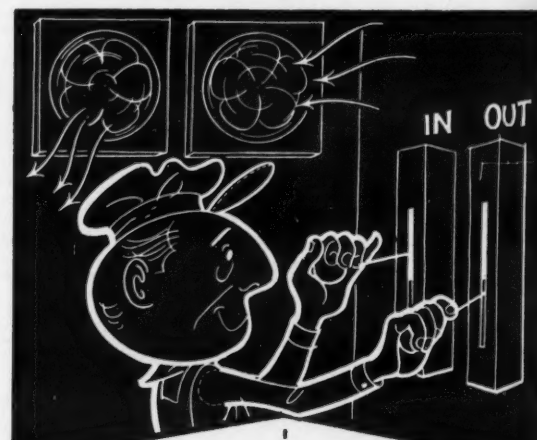
Type SB illustrated is completely self-supporting. For fully engineering data write for Bulletin S-3002.

Johnson started the whole idea... is far ahead in know-how, available types and sizes. Johnson Joints are completely packless, need no lubrication or adjustment. Used on dryer rolls, mills, waxers, calenders, slashers, printing presses, etc.—handling steam, water, hot heat transfer oils, Dowtherm, Monsanto Aroclors, etc. Actually serving under pressures as high as 2400 psi. Sizes up to 8".



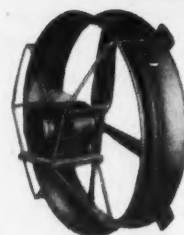
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826 Wood St., Three Rivers, Michigan

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to provide reversible air movement at the flick of a switch. But you can do the same job more efficiently and economically with a Hartzell reversible fan or roof ventilator. Write for details.



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NOVEMBER 1959

1607*	1663*	1719	1775	1831	1887
1608	1664	1720	1776	1832	1888
1609*	1665	1721	1777	1833	1889
1610	1666	1722	1778	1834*	1890
1611	1667	1723	1779	1835	1891
1612	1668	1724	1780	1836	1892
1613	1669	1725	1781	1837	1893
1614	1670	1726	1782	1838	1894
1615	1671	1727	1783	1839	1895
1616	1672	1728	1784	1840	1896
1617	1673	1729	1785	1841	1897
1618	1674*	1730	1786	1842	1898
1619	1675	1731	1787	1843	1899
1620	1676	1732	1788	1844	1900
1621	1677	1733	1789	1845	1901
1622	1678	1734	1790	1846	1902
1623	1679	1735	1791*	1847	1903
1624	1680	1736	1792	1848	1904
1625*	1681*	1737	1793	1849	1905
1626	1682	1738	1794	1850	1906
1627	1683	1739	1795	1851	1907
1628	1684	1740	1796	1852	1908
1629*	1685	1741	1797	1853	1909
1630	1686	1742	1798	1854	1910
1631	1687	1743	1799	1855	1911
1632	1688	1744	1800	1856	1912
1633	1689	1745*	1801	1857	1913
1634	1690	1746	1802	1858	1914
1635	1691	1747	1803	1859	1915
1636	1692	1748	1804	1860	1916
1637	1693	1749	1805	1861*	1917
1638	1694	1750	1806	1862	1918
1639	1695	1751	1807	1863	1919
1640	1696	1752	1808	1864	1920
1641	1697	1753	1809	1865	1921
1642	1698	1754	1810	1866	1922
1643	1699	1755	1811	1867	1923
1644	1700	1756	1812	1868	1924
1645	1701	1757	1813	1869	1925
1646*	1702	1758	1814	1870	1926
1647	1703	1759	1815	1871	1927
1648	1704	1760	1816	1872	1928
1649	1705	1761	1817	1873	1929
1650	1706	1762	1818	1874	1930
1651	1707	1763	1819	1875	1931
1652	1708	1764	1820	1876*	1932
1653	1709	1765	1821	1877	1933
1654	1710	1766	1822	1878	1934
1655	1711	1767	1823	1879	1935
1656	1712	1768	1824	1880	1936*
1657	1713	1769	1825	1881	1937
1658	1714	1770	1826	1882	1938
1659*	1715	1771	1827	1883	1939
1660	1716	1772	1828	1884	1940
1661	1717	1773	1829	1885	1941
1662	1718	1774	1830	1886	1942

Key No.	Description
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**See additional numbers on reverse side**

## READER SERVICE SLIP

Continued from reverse side of this sheet

NOVEMBER 1959

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- |                                |                                |                                |                               |                               |                                |
|--------------------------------|--------------------------------|--------------------------------|-------------------------------|-------------------------------|--------------------------------|
| <input type="checkbox"/> 1943  | <input type="checkbox"/> 1997  | <input type="checkbox"/> 2051  | <input type="checkbox"/> 2105 | <input type="checkbox"/> 2159 | <input type="checkbox"/> 2219  |
| <input type="checkbox"/> 1944  | <input type="checkbox"/> 1998  | <input type="checkbox"/> 2052  | <input type="checkbox"/> 2106 | <input type="checkbox"/> 2160 | <input type="checkbox"/> 2214  |
| <input type="checkbox"/> 1945  | <input type="checkbox"/> 1999  | <input type="checkbox"/> 2053  | <input type="checkbox"/> 2107 | <input type="checkbox"/> 2161 | <input type="checkbox"/> 2215  |
| <input type="checkbox"/> 1946  | <input type="checkbox"/> 2000* | <input type="checkbox"/> 2054  | <input type="checkbox"/> 2108 | <input type="checkbox"/> 2162 | <input type="checkbox"/> 2216  |
| <input type="checkbox"/> 1947  | <input type="checkbox"/> 2001  | <input type="checkbox"/> 2055  | <input type="checkbox"/> 2109 | <input type="checkbox"/> 2163 | <input type="checkbox"/> 2217  |
| <input type="checkbox"/> 1948  | <input type="checkbox"/> 2002  | <input type="checkbox"/> 2056  | <input type="checkbox"/> 2110 | <input type="checkbox"/> 2164 | <input type="checkbox"/> 2218  |
| <input type="checkbox"/> 1949  | <input type="checkbox"/> 2003* | <input type="checkbox"/> 2057  | <input type="checkbox"/> 2111 | <input type="checkbox"/> 2165 | <input type="checkbox"/> 2219  |
| <input type="checkbox"/> 1950  | <input type="checkbox"/> 2004  | <input type="checkbox"/> 2058  | <input type="checkbox"/> 2112 | <input type="checkbox"/> 2166 | <input type="checkbox"/> 2220  |
| <input type="checkbox"/> 1951  | <input type="checkbox"/> 2005  | <input type="checkbox"/> 2059  | <input type="checkbox"/> 2113 | <input type="checkbox"/> 2167 | <input type="checkbox"/> 2221  |
| <input type="checkbox"/> 1952  | <input type="checkbox"/> 2006  | <input type="checkbox"/> 2060  | <input type="checkbox"/> 2114 | <input type="checkbox"/> 2168 | <input type="checkbox"/> 2222  |
| <input type="checkbox"/> 1953  | <input type="checkbox"/> 2007  | <input type="checkbox"/> 2061  | <input type="checkbox"/> 2115 | <input type="checkbox"/> 2169 | <input type="checkbox"/> 2223  |
| <input type="checkbox"/> 1954  | <input type="checkbox"/> 2008  | <input type="checkbox"/> 2062  | <input type="checkbox"/> 2116 | <input type="checkbox"/> 2170 | <input type="checkbox"/> 2224  |
| <input type="checkbox"/> 1955  | <input type="checkbox"/> 2009  | <input type="checkbox"/> 2063  | <input type="checkbox"/> 2117 | <input type="checkbox"/> 2171 | <input type="checkbox"/> 2225* |
| <input type="checkbox"/> 1956  | <input type="checkbox"/> 2010  | <input type="checkbox"/> 2064  | <input type="checkbox"/> 2118 | <input type="checkbox"/> 2172 | <input type="checkbox"/> 2226  |
| <input type="checkbox"/> 1957  | <input type="checkbox"/> 2011  | <input type="checkbox"/> 2065  | <input type="checkbox"/> 2119 | <input type="checkbox"/> 2173 | <input type="checkbox"/> 2227  |
| <input type="checkbox"/> 1958  | <input type="checkbox"/> 2012  | <input type="checkbox"/> 2066  | <input type="checkbox"/> 2120 | <input type="checkbox"/> 2174 | <input type="checkbox"/> 2228  |
| <input type="checkbox"/> 1959  | <input type="checkbox"/> 2013  | <input type="checkbox"/> 2067  | <input type="checkbox"/> 2121 | <input type="checkbox"/> 2175 | <input type="checkbox"/> 2229  |
| <input type="checkbox"/> 1960  | <input type="checkbox"/> 2014  | <input type="checkbox"/> 2068  | <input type="checkbox"/> 2122 | <input type="checkbox"/> 2176 | <input type="checkbox"/> 2230  |
| <input type="checkbox"/> 1961  | <input type="checkbox"/> 2015  | <input type="checkbox"/> 2069  | <input type="checkbox"/> 2123 | <input type="checkbox"/> 2177 | <input type="checkbox"/> 2231  |
| <input type="checkbox"/> 1962  | <input type="checkbox"/> 2016  | <input type="checkbox"/> 2070  | <input type="checkbox"/> 2124 | <input type="checkbox"/> 2178 | <input type="checkbox"/> 2232  |
| <input type="checkbox"/> 1963* | <input type="checkbox"/> 2017  | <input type="checkbox"/> 2071  | <input type="checkbox"/> 2125 | <input type="checkbox"/> 2179 | <input type="checkbox"/> 2233  |
| <input type="checkbox"/> 1964  | <input type="checkbox"/> 2018  | <input type="checkbox"/> 2072  | <input type="checkbox"/> 2126 | <input type="checkbox"/> 2180 | <input type="checkbox"/> 2234  |
| <input type="checkbox"/> 1965  | <input type="checkbox"/> 2019  | <input type="checkbox"/> 2073  | <input type="checkbox"/> 2127 | <input type="checkbox"/> 2181 | <input type="checkbox"/> 2235  |
| <input type="checkbox"/> 1966* | <input type="checkbox"/> 2020  | <input type="checkbox"/> 2074  | <input type="checkbox"/> 2128 | <input type="checkbox"/> 2182 | <input type="checkbox"/> 2236  |
| <input type="checkbox"/> 1967  | <input type="checkbox"/> 2021  | <input type="checkbox"/> 2075  | <input type="checkbox"/> 2129 | <input type="checkbox"/> 2183 | <input type="checkbox"/> 2237  |
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| <input type="checkbox"/> 1970  | <input type="checkbox"/> 2024  | <input type="checkbox"/> 2078  | <input type="checkbox"/> 2132 | <input type="checkbox"/> 2186 | <input type="checkbox"/> 2240  |
| <input type="checkbox"/> 1971  | <input type="checkbox"/> 2025* | <input type="checkbox"/> 2079  | <input type="checkbox"/> 2133 | <input type="checkbox"/> 2187 | <input type="checkbox"/> 2241  |
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| <input type="checkbox"/> 1974  | <input type="checkbox"/> 2028  | <input type="checkbox"/> 2082* | <input type="checkbox"/> 2136 | <input type="checkbox"/> 2190 | <input type="checkbox"/> 2244  |
| <input type="checkbox"/> 1975  | <input type="checkbox"/> 2029  | <input type="checkbox"/> 2083  | <input type="checkbox"/> 2137 | <input type="checkbox"/> 2191 | <input type="checkbox"/> 2245  |
| <input type="checkbox"/> 1976  | <input type="checkbox"/> 2030  | <input type="checkbox"/> 2084  | <input type="checkbox"/> 2138 | <input type="checkbox"/> 2192 | <input type="checkbox"/> 2246  |
| <input type="checkbox"/> 1977  | <input type="checkbox"/> 2031  | <input type="checkbox"/> 2085  | <input type="checkbox"/> 2139 | <input type="checkbox"/> 2193 | <input type="checkbox"/> 2247  |
| <input type="checkbox"/> 1978  | <input type="checkbox"/> 2032* | <input type="checkbox"/> 2086  | <input type="checkbox"/> 2140 | <input type="checkbox"/> 2194 | <input type="checkbox"/> 2248  |
| <input type="checkbox"/> 1979  | <input type="checkbox"/> 2033  | <input type="checkbox"/> 2087* | <input type="checkbox"/> 2141 | <input type="checkbox"/> 2195 | <input type="checkbox"/> 2249  |
| <input type="checkbox"/> 1980  | <input type="checkbox"/> 2034  | <input type="checkbox"/> 2088  | <input type="checkbox"/> 2142 | <input type="checkbox"/> 2196 | <input type="checkbox"/> 2250  |
| <input type="checkbox"/> 1981  | <input type="checkbox"/> 2035  | <input type="checkbox"/> 2089  | <input type="checkbox"/> 2143 | <input type="checkbox"/> 2197 | <input type="checkbox"/> 2251  |
| <input type="checkbox"/> 1982  | <input type="checkbox"/> 2036  | <input type="checkbox"/> 2090  | <input type="checkbox"/> 2144 | <input type="checkbox"/> 2198 | <input type="checkbox"/> 2252  |
| <input type="checkbox"/> 1983  | <input type="checkbox"/> 2037  | <input type="checkbox"/> 2091  | <input type="checkbox"/> 2145 | <input type="checkbox"/> 2199 | <input type="checkbox"/> 2253  |
| <input type="checkbox"/> 1984  | <input type="checkbox"/> 2038  | <input type="checkbox"/> 2092  | <input type="checkbox"/> 2146 | <input type="checkbox"/> 2200 | <input type="checkbox"/> 2254  |
| <input type="checkbox"/> 1985  | <input type="checkbox"/> 2039  | <input type="checkbox"/> 2093  | <input type="checkbox"/> 2147 | <input type="checkbox"/> 2201 | <input type="checkbox"/> 2255  |
| <input type="checkbox"/> 1986  | <input type="checkbox"/> 2040  | <input type="checkbox"/> 2094  |                               |                               |                                |

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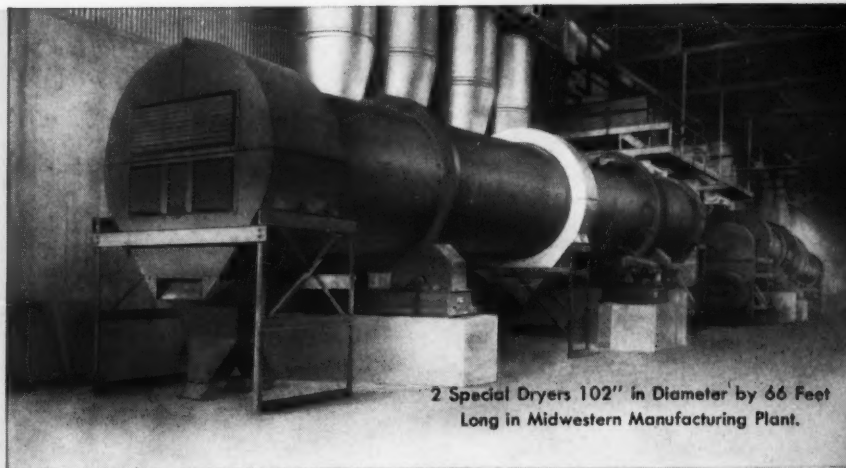
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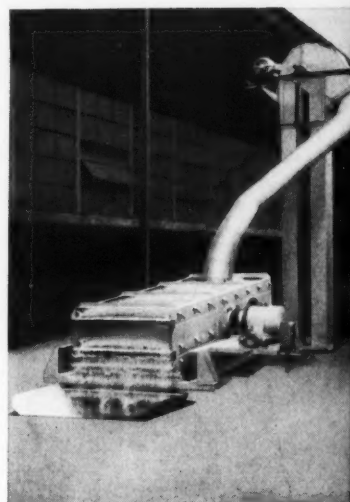
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